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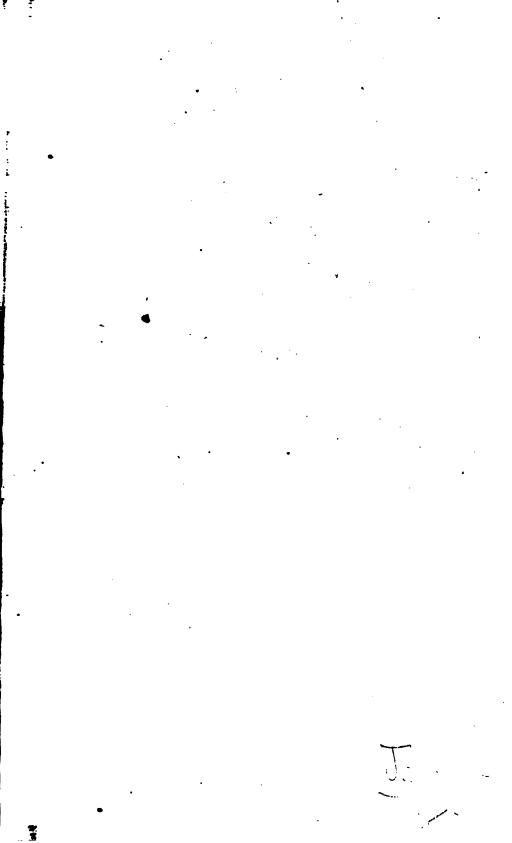
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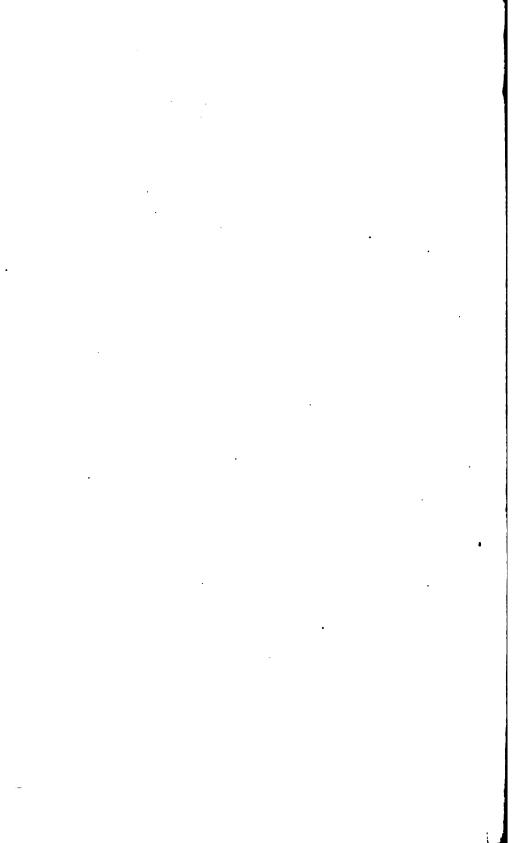
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The

Journal of School Geography

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

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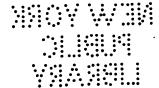
VOLUME I.—1897.

Lancaster, Pa. 1897.

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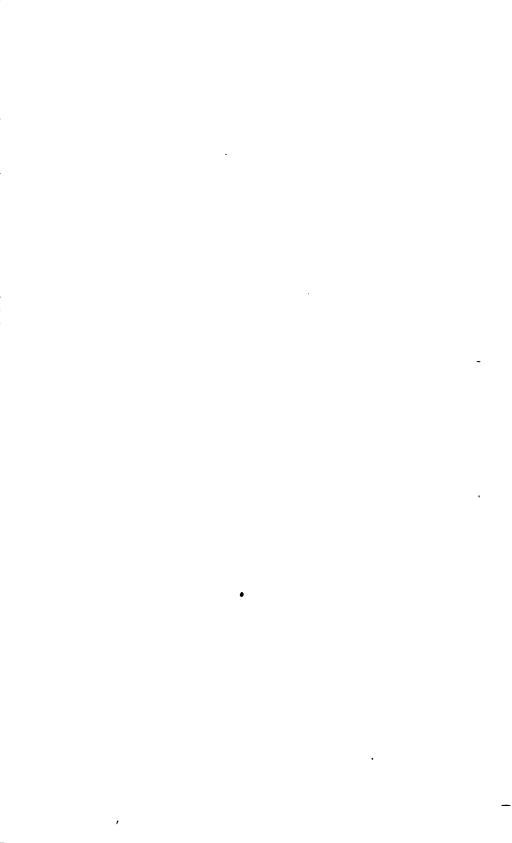
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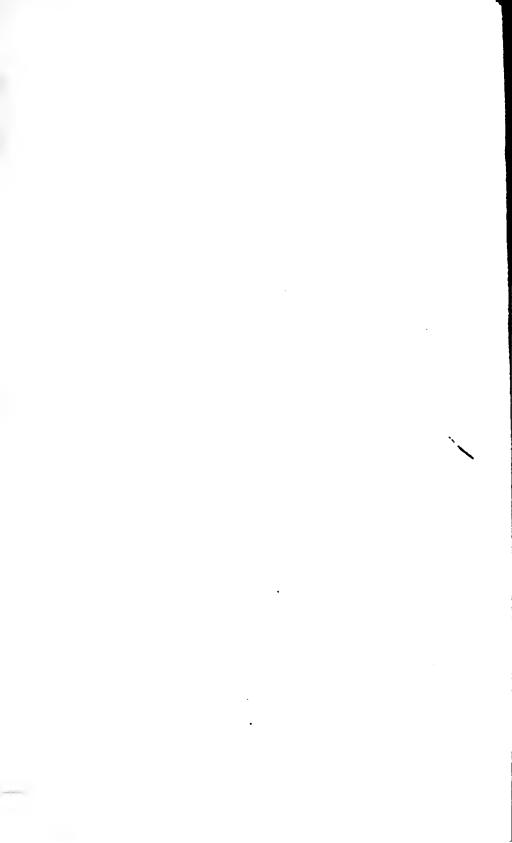
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TERMS OF SUBSCRIPTION.

One dollar a year in advance. Single copies 15 cents. Subscriptions should be sent to the Journal of School Geography, 41 North Queen Street. Lancaster, Pa.

Mss. intended for publication, books, etc., intended for review, and all correspondence, except concerning subscriptions, should be sent to the reponsible editor, Richard E. Dodge, Teachers College, 120th Street West, New York City.

INTRODUCTORY.

The Journal of School Geography begins its existence with the present number. The editors hope that it may fill a want that they believe exists among the majority of the teachers of this country. Our aim will be to advance in every way possible the cause of good geography teaching in the elementary and secondary schools. We will try to present the newest and best information in such a form that it can readily be used by any teacher. We shall not print information unless we have every reason to believe it is fact and not rumor, and shall try to have all articles free from circumlocutions and flowery language. We shall attempt to treat all phases of the broad science of geography and shall be pleased to receive suggestions and notes from all interested. Readers are requested to offer suggestions as to topics to be considered and the editors will do their best to satisfy what seems to be a general demand for special information.

Each of the editors is a worker in geography, either as an investigator or teacher, or both. Every one is now teaching or has taught; all have to do with the problems of the schools; and several are making these problems their chief study.

The geography of different regions and countries will be treated by writers personally familiar with conditions they treat. So far as possible, all articles will be treated by experts, and many well known geographers of the United States have promised their help. Among articles that will appear at an early date are the following: The Geography of Wheat and Corn, The Mammoth Cave, Alabama, The Delta of the Mississippi, The Great Lakes, The Use and Meaning of Maps, The Geography of New York City, The Ocean Currents, The Geography of Cotton. Many other articles are already promised.

The NOTES in which will be collected interesting and helpful points gained from all available sources, will be made an important part of the magazine. Reference to geographical literature, appliances and illustrations will appear when possible.

Whenever a summary is given, direct reference will be made to the publication summarized, and due credit will be given for all assistance. The Journal is independent of all schools of geography, of all institutions of learning and of all book concerns. The editors will try to treat all fairly and justly and to give helpful, critical and impartial reviews of all the new material that may come to their notice.

In short, we shall spare no effort within our means to make this paper a genuine source of help and a valuable geographical aid to teachers and we invoke your assistance by contribution of subscriptions or ideas. Those responsible for the undertaking feel that all are associates in a common cause, and hope that there will be a most friendly sympathy and helpful co-operation between editors and readers.

HOME GEOGRAPHY.

The study of home geography does not find its chief recommendation in the local information that it provides, but rather in the aid that it furnishes through local examples to the general study of geography, by giving full meaning and reality to geographical facts and relationships the world over. The reason for this is that geography as a whole is hardly more than a compilation of innumerable local or home geographies. However the home geographies of different places may vary, the distant ones

can always be better appreciated if the local one is consciously observed and understood as a member of the class to which it belongs.

There are certain important principles that the teacher should bear in mind during the progress of local study. Geography teaches us about the way that people live on the earth—this being a rough conversational definition of this subject, sufficing to embody in elementary form "the study of the earth in relation to Geography is therefore concerned with two classes of facts and with the relations in which the two classes stand. first class embraces all necessary facts about the inorganic earthland, water, air-and about plants and animals considered as the non-human inhabitants of the earth; the second includes the necessary facts as to the manner of man's living, from the savage to the civilized state, from wandering nomads to fixed populations, from the thieving of warfare to the competition of trade. only as the facts that constitute these two classes come to be understood that their relationships can be studied; and this matter of relationship then becomes the very soul of geography. items of geographical text-books are then not merely so many absolute, empirical statements; they are examples of the relationship established in a certain region between man and his natural environment.

Actual examples of geographical facts and relationships are to be seen on every hand. No teacher need be entirely dependent upon a text-book. When geographical facts are taught from text-book alone they are bereft of their natural foundation and fail to develop that interest in the child that should be aroused and that can be aroused if geography is based on personal observation.

A few suggestions follow as to what can be done in this way in an excursion covering a hill and a valley with a brook or river. In such an excursion are included many facts that deserve observational study through a large educational range, from elementary grades to the university. At first, a simple statement of directly observed facts suffices. But very soon, the nature of the facts will be better appreciated if their fuller meaning, their physiographic life is pointed out. Thus a brook comes to be recognized

as a stream of water, fed directly or indirectly by rainfall, and bearing the waste of the land towards the sea. The soil on the valley slopes is rock-waste, a result of weathering and not yet washed away. The continuation of the activities that are associated with and may be studied near the brook must produce certain slow changes in the form of the valley; and it is by the long continuation of such activities in the past that the present form of the valley has been produced. With progressive weathering and washing on the two slopes of a hill, it must in time dwindle away; and the same processes acting through the past have carved the hill into its existing form. Thus not only the facts, but the nature and meaning of the facts become clear and vivid.

The features of a coast line may be treated in the same way. A part of the line may be traced and its peculiarities noted; thus the simple facts become clear. But very soon, the coast line should be treated in its true physiographic relations. It is the line where the sea borders on the land; and this line has been determined in the first place by such elevation or depression as the land has last suffered, whereby the waters came to lie upon it at a certain level, thus giving the initial shore line a certain form; second, by the activities of rivers and of the sea-waves, tides, currents—which have brought about certain changes whereby the initial shore line has become the actual shore line. The ease or difficulty of understanding the present shore form is partly determined by the nature of the local example studied, but more largely by the knowledge or the lack of it on part of the teacher.

The phenomena of the weather serve admirably to develop the habit of observation, yielding a large return in facts of importance, many of which are susceptible of simple explanation, and thus it is not to the rivers and ocean alone that we must turn for observational study of geographic facts. The geographical portion of the study of animals and plants also presents interesting examples of similar healthful exercises in geography, but the limits of space forbid their consideration at this time.

It will be noticed that in the paragraphs dealing with rivers and coast lines, something of explanation is introduced. This I hold to strongly, as introducing the rational element into geography, and thus invoking the understanding to aid the memory. It is not merely for the sake of knowing how hills and valleys are made that the problem of weathering and washing is discussed; it is discussed because the facts concerning the hills and valleys of to-day, at home and abroad, can be much better appreciated if one understands how the hills and valleys have originated. There can be no question of the truth of this principle; hence I would urge on every teacher the importance of not only leading pupils to observe accessible facts, but of leading them quickly and easily to perceive the meaning of the facts observed. And with this brief consideration of the first class of geographical facts, let us turn to the second.

A village is an admirable subject for observation of human Notice the increasing closeness of the houses towards the center, around the stores and offices; note the larger open spaces about the border of the village. See how the roads converge towards it from the surrounding country. Consider the traffic on the roads, inward and outward. All of this should be taken, not merely as local fact, but as an example of a way in which some of the people of a certain country in the world live. After direct observation, comes simple explanation. The post office is near the center of the village, because it there best serves general convenience. A single road leads out for a mile and then forks into two; because it is cheaper to reach two districts in this way than by two independent roads. Some of the villagers work in shops, others are employed in a bank, or at a railroad station; thus diversity of occupation is first observed, then accounted for. growth of the village may be explained, story-fashion. the hill, it is seen to have a life-history.

It is sometimes said that in the schools of large cities, observational study is impossible; but this is a serious mistake. It arises from the failure to perceive that a city belongs in one of the most important sub-classes of geographical facts. Consider, for example, what may be seen on a single street. It is paved and curbed; it is lighted, watered and drained; houses are built closely along it, and they vary in size, construction and use. Remark the activities of the street; the varying stream of people, passing this way and that, crowding the sidewalks at certain hours, deserting them at others. Observe the traffic in wagons, the passengers in cars. Here is fact in abundance. This all exhibits the way in

which people live at certain places, called cities, where for some reason many thousands are crowded on a small area. Why are they thus crowded? Why are some cities or villages larger or smaller than others? Is this particular city larger now than it used to be? Through these observations and questions, the human element of geographical study is prominently brought forward, as it should be.

It is not only through the principle of likeness that home facts are useful in describing distant facts; the principle of contrast is no less helpful and important. The children of a city school may learn not only about other cities by comparison, but they may learn about smaller gatherings of population, as in villages; they may even expand their parks into a useful understanding of fields and forests by playing variations on dimensions. An excursion over a hill or across a valley may be extended to a great variety of lessons, about mountains and plains, large rivers and small, fertile regions and deserts. A winter cold snap illustrates the climate of the frigid zone; a summer hot spell exemplifies that of the torrid zone. A drought serves as a sample of an arid climate; a period of heavy rain introduces stories of the excessive rainfall of the equatorial belt.

In all this extension of the local to the remote, I would urge teachers not to be too logical. Some hesitate to mention Africa until Africa has been "studied." This is too formal. Surely, no good narrator would, before telling a story to children out of school, ask if they had studied about the continent where the story is located; he might however wisely select for his scene an unstudied region, and thus make way for it. Here, as in certain other cases, the teacher may often in school imitate to advantage the informal methods that prevail out of school.

Finally, as more and more individual examples of the two fundamental classes of geographical facts accumulate, bring them into their relation. The site of a village has meaning in it; it is a consequence of some natural factors of form, or group of forms. In one case a village lies on an upland so as to be away from the steep-sided, narrow ravines that dissect a plateau; in another a village lies on a valley floor, because the hills are too high and too isolated to serve as convenient centers of population. Certain

parts of a coast line are very thinly inhabited; these generally offer poor opportunity of embarking or coming ashore. Between many miles of such coast a natural harbor may determine the location of a large city. Roads and railroads, fields and forests, farming and manufacturing all respond to geographical environment. From beginning to end, from the simplest and most apparent examples of relationships ready at hand for every teacher, to those most involved examples which the professional geographer is trying to clear up, the relation of man to the earth is a most alluring study. The attentive cultivation of home geography, taking advantage of the many examples of the two classes of geographical facts that are spread about us, affords a natural, observational, rational basis on which the larger aspects of the study may be securely founded.

W. M. DAVIS.

HABVARD UNIVERSITY, Cambridge, Mass.

SOME THINGS ABOUT AFRICA.

After giving a good deal of his time for fourteen years to the work M. de Lannoy de Bissy, the French military engineer, completed his map of Africa about seven years ago. The scale was I: 2,000,000 (about 32 statute miles to the inch) and it is the largest map of Africa that has yet been completed. In making it, the author says he consulted between 1,500 and 1,800 route maps and other maps of the continent, published or in manuscript, by far the larger part of which were the work of explorers within the past forty years. The world never saw before such an outburst of zeal for geographic discovery as the past half century has witnessed in Africa. So much fairly accurate information about one of the continents was never collected before in so short a time. years ago the most of inner Africa was a blank on our maps as far as accurate information was concerned. But we know a great deal more about Africa to-day than was known about North America at the time of our Revolutionary war. Three hundred years after Columbus discovered America, school children were told that the only extensive mountains in North America were the Alleghanies. Such a blunder as that would not be made to-day, by any well-read person, about any part of Africa.

8 AFRICA.

Of course this great work of discovery has resulted in changing many of our ideas about Africa, a few of which are given below. Students were told, not so very long ago, that the Sahara desert was a vast, sandy waste, but we now know that far the larger part of it cannot properly be thus characterized and that most of the desert needs only water to make it a fertile, fruitful The idea was very common once that a large part of the desert was below sea-level and this gave rise to a project, about 25 years ago, to dig a canal, just a little south of Morocco, to admit the Atlantic waters into the western part of the Sahara and convert it into a vast inland sea with ports along the fruitful western Sudan. Our present knowledge seems to justify the conclusion that the mean elevation of the Sahara above the sea is probably about 1500 feet and we know of no depressions below the sea except in a few small areas, far east, along the northern border. formerly saw the Kong mountains depicted with particular blackness on school maps, stretching east and west, north of the Gulf of Guinea. We now know there are no such mountains: but where they were supposed to be is the edge of an elevated plateau extending far to the north.

It was said until quite recently that not a single river along the east and west coasts afforded a navigable highway from the sea to the far interior. This is not quite true. Many years ago traders knew of what they called the Oil rivers emptying into the Gulf of Guinea, but it was not known then they were the outlets of the Niger river, parts of the most extensive delta in Africa, and that one of them might easily be ascended by small steamboats to the main channel of the Niger, then to the Benue affluent and far up that river to Yola, about 900 miles by river from the Niger delta. Though Africa is very poorly provided with rivers navigable for long distances inland from the sea, we must credit her with some advantages revealed by the discoveries of recent years. Eight years ago the Tana river, which takes its rises near Mount Kenia, was so little known that its course could not be laid down on the maps. It has since been ascended fully 300 miles by a small steamer from the Indian ocean. A little further north, the Jub river was ascended in 1891, by Capt. Dundas's steamer for 380 miles.

AFRICA. 9

Until Mr. Rankin discovered in 1889 the navigable Chinde branch of the Zambesi delta, it was supposed that this, the fourth largest river of Africa, would be greatly restricted as a commercial highway because no steamer could get access to the river from the sea. The discovery of the delta considerably stimulated Zambesi commerce, which, however, may not continue because the Chinde is reported to be silting up. Artificial means will probably be employed to keep the channel clear.

The Congo railroad around the 235 miles of cataracts is now more than half completed and when it reaches Stanley Pool it will connect with steamers that can traverse the upper Congo and its tributaries for a distance estimated by Mr. Stanley eleven years ago, at about 4000 miles, but now known to be about 7000 miles.

These few facts are given simply to illustrate the changes that have been rapidly occurring in our ideas of Africa. They may be multiplied many fold in all departments of geographic study, but they are sufficient to emphasize the need of the most recent literary aids in the teaching of African geography. The great development of interest in African geography has made it possible for a teacher to acquire a very good general knowledge of Africa without expending time that only a specialist can afford to give. last very good compendiums of our knowledge of Africa, are beginning to appear and from them the skillful teacher may derive much valuable material which will help him in the class-room not only to depict the facts but also to illustrate the principles of geography. The latest and most complete of these works in English is the "Africa," in two volumes, by Prof. A. H. Keane which appears in the new edition of "Stanford's Compendium of Geography and Travel;" and the "Afrika" of Prof. W. Sievers is a recent and excellent work in German.

Practically all the geographical text-books published in this country have recently been revised or are now in process of revision and some new works have appeared which give much of the latest and best African data. But the treatment of Africa in our text-books suffers somewhat in comparison with that of other parts of the world because the sources of information are both numerous and very recent, and the makers of school geographies do not always hit upon the best and most authoritative

sources. To be really well equipped therefore, the teacher should have access to one of these compendiums, in which the results of the work of hundreds of explorers, and geographers are summarized in a clear and systematic manner, by a specially qualified writer. Such compendiums of Africa and the other continents should be in the reference library of all schools that can afford the investment.

CYRUS C. ADAMS.

NEW YORK SUN.

GEOGRAPHIC INSTRUCTION IN GERMANY.

In no one subject of instruction has Germany more to teach the American schoolmaster than in the study of geography. The subject has long since attained a dignity and importance in the Fatherland which it has yet to acquire in our own country. Comenius early saw its possibilities, and Pestalozzi, at Burgdorf and Yverdon, showed what the elementary schools could do with the subject. Karl Ritter, who shaped the pedagogic tendencies of geographic instruction in Germany, spent some time in study at Yverdon under the Swiss reformer, and in his later life wrote: "Pestalozzi knew less geography than a child in our elementary schools; yet it was from him that I gained my chief knowledge of this science; for it was in listening to him that I first conceived the idea of the natural method. It was he who opened the way to me."

Since Ritter's day geography has been universally taught and well taught—not merely in the elementary schools, but continued in the high schools, and extended courses of instruction provided in the universities. When I was a student in Germany, two years ago, nineteen of the twenty-one German universities had professors of geography, Heidelberg and Rostock being the exceptions, in all forty-five men teaching the subject to university students. At Jena, Professor Peschuel-Loesche, well-known in this country, was at the head of the department. At Leipzig, in addition to the two geographic seminaries, four courses were offered the summer term of 1895: (1). General earth knowledge—historical introduction and methods of teaching the subject, four hours a week:

(2). Geography of the sea and climatology, two hours; (3). Geography of the Mediterranean and the Mediterranean countries, two hours; (4). Geography of America, two hours. In the seminaries, geographic explorations with the literature of travel, and the study and use of maps, formed the basis of the work. The department at Leipzig was under the direction of Professor Ratzel, the author of the justly celebrated Völkerkunde, and his assistants were Hettner and Fischer.

German students do not begin the study of geography in the university: there has been an extended study of the subject in the elementary and secondary schools. The following table shows the time devoted to the study of geography in the different types of German schools, with the time devoted to the subject in the public schools of Boston, which I think may be considered typical of American schools:

PLACE.	Kind of School.	No. yrs. in course.	I	11	m	v	v	VI	VII	VIII	IX	Total
Dresden	Bürgerschule (elementary) school).	. 8	4	8	2	2	2		2	2		19
Weimer	Realschule (elementary and English High).	10	2	2		2	2	2	1	⅓	1½	0,15
Leipzig.	Höhremädchenschule (ele-) mentary and High).	10	1	1	1	1	2		2	2	2	2 16
Berlin	Real gymnasium (elemen- tary and Latin High).	9	1	1	2	2	2	2	11/2	11/2	11/2	141/2
Weimar	Gymnasium (elementary and classical High).	9	2	2	, 2	1½	11/2	11/2	11/2	11/2	11/9	15
Boston	Primary and Grammar	9	0	0	. 0	0			21/2		2	111,2
Boston	English High	4	0	0	0	0	$ \left\{ \begin{array}{l} \text{added to primary and} \\ \text{grammar.} \end{array} \right\} 11_{2}^{1} $					
Boston. Latin High 5 2 2½ 0 0 0 {added to primary and grammar.} 16												

The number of high schools in America giving instruction in geography is admittedly small, so that the average child in this country gets about the equivalent of ten to twelve hours as against fifteen to twenty in Germany, and in the latter country distributed throughout the school course. What is true of the elementary and secondary schools is equally true of the normal schools. At Weimar, for example, where the students are admitted after completing the course of instruction in the elementary schools (8 years) a six-year course is provided in the normal school. Geography is given two hours a week the first, second, third and fourth years, one and a-half hours the fifth year and one hour the sixth year, or

ten and a-half hours for the six years. At Bridgewater, Mass., which may perhaps be taken as a type of the better American normal school, geography receives five hours for one-half year. The subject is recognized as having large educational value in the intellectual development of the German child, and this recognition finds expression in all their courses of study and recitation programs.

Home geography (Heimatskunde), the study of the local forms and forces within the observation of the child, preliminary to the more formal study of the book, is peculiar to Germany. This is also an incorporation from Pestalozzianism. Hennig, who was a student in the normal school at Yverdon for a longer time than Karl Ritter, published in 1812, his method of teaching geography, and Fingers's Method of Instruction in Elementary Geography, which continues to be the method of procedure in Germany, is based directly upon Hennig's work.

German home geography is based upon a study of geographic features within easy reach of the school house, by means of excursions through the town, or to country places not distant from the Teacher and children make the excursion together during school hours. Sometimes it occupies a half-hour; sometimes two hours; sometimes a half-day. In a German town of 15,000 inhabitants I occasionally accompanied the second grade of a primary school on these geographic excursions; and more orderly, systematic instruction I have never seen. The purpose of the excursion was generally stated by the teacher before leaving the school room. When the place was reached, a halt was called, and the open-air lesson was begun. Sometimes it was in crowded streets in the town, with incessant streams of passing carriages, but the children took no heed of the passers and the passers paid no attention to the children, for they had been taught geography that way themselves when they were young. Agassiz said some years ago of elementary science in the schools of America, "We study Nature in the school room and go out doors and cannot find her." This cannot be said of Germany, since the early work both in nature study and geography is largely done in the open air. out-door lessons consist of observations on the forms and forces of land and water, study of the economic uses and collection of plants,

animals and minerals, visits to local factories and industries, and sketches and drawings of the objects and forms studied. In this particular primary school, the geographic excursions came fortnightly; and although home geography came twice a week, the observations and drawings were made the basis of the indoor instruction during the intervals.

Learning lessons from the book—committing geographic facts to memory—so characteristic of our work in the United States, is almost unknown in Germany. A German school superintendent, in the printed directions to his teachers, says: "Geography being so full of matter, and most atlases and text-books so crammed with numbers and names, the teacher is easily tempted to exact too much from the pupils. Be moderate in your demands on the memory. This should be your rule: Leave unlearnt, if possible unmentioned, whatever in the way of figures and names cannot be permanently remembered, whatever seems unessential to the aim and sequence of the subject, and whatever cannot be used in illustrating a general principle."

The study of people—the human side of the study—receives larger consideration there than here. It was not uncommon to find German children knowing much more about the American Indians, for example, than I. The social and industrial life of the different races, with their physical and mental characteristics, is studied by the aid of descriptions, pictures and charts. Völkerkunde, the races of man and their geographic distribution, begins early in the school course and continues through the university. Our own literature on this subject being so barren, Mr. Butler and Professor Tylor have placed all English speaking students and practitioners of geography under lasting obligations to them for the admirable translation of Professor Ratzel's great work on Völkerkunde. (Macmillan, New York, 1896).

In the use of pictures, German geographic practices differ widely from the English and American. Pictures are studied quite as much as texts. "Das Bild spricht beredter als die beste Schilderung die wir hören oder lesen" (the picture speaks more eloquently than any description we can hear or read) is a German pedagogical maxim that is nowhere more frequently applied than in the teaching of geography. Collections of pictures illustrating

people, customs, landscapes and physical features, such as Ferdinand Hirt's Geographische Bildertafeln (5 vols.) are numerous and inexpensive, and the school children are taught to read the pictures.

The purpose of this article is not to glorify German methods and disparage American practices; but to show what is done in the one country that seems to be rational, and what is left undone in the other that would be helpful. Geographic instruction in English-speaking countries is confessedly unsatisfactory; and it is the belief of the present writer that to attain better results we must-to borrow an expression from Pestalozzi-turn the geographic wagon right round. And Germany has a good many lessons to teach us, the lessons of long and successful experience. For nearly a century geography has been well taught in all her elementary and secondary schools; her universities have dignified it; her normal schools have given teachers adequate preparation to teach the subject; geographic museums have sprung up throughout the empire, bringing to the attention of school officials the best aids and appliances; geographic societies, in even the smaller towns, with frequent lectures to the people, have broadened and deepened the study in the later life and larger experience; and geographic journals, both scientific and pedagogic, have regularly brought to the notice of teachers and taught the latest and best development of geographic thought.

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SOME SUGGESTIONS REGARDING GEOGRAPHY IN GRADE SCHOOLS.

The problem of "What is Geography" and what we should include and teach under this science without conflicting with the fields of other sciences, has been much debated and argued; in fact, much energy and a great deal of valuable time, that might much better have been devoted to the consideration of the principles and aims of the teaching as a whole, has been taken in an argument over terms. For the purpose of the paper we have in hand, let us define geography as the study of the earth in its relation to man. In other words, it is the study of all those features, char-

acteristics and conditions of the earth that influence or have influenced man in his history, development, exploration and life. Such a study of all the fundamental features that have worked alone or in co-operation to cause man to have his present distribution over the earth, and to give him certain characteristics in those localities, involves the understanding of many different things; each one of which, has had a primary or secondary importance in determining the present conditions. The study of the geography of the world, therefore, involves the study of these fundamental features among which are the distribution of land and water in the great continents, their topography or shape, the distribution and character of the rivers, the climate and its effects, the winds, ocean currents, the soils, the shore line and many other things. These, are the geographic factors, the conditions of air, and earth, and water which have determined very largely the history and dis-Besides these conditions which may be tribution of mankind. called the physical features of the earth, man has been influenced, and very largely, by other controls that we may term economic. He is dependent for his life and for his ability to overcome the obstacles of nature in many ways, upon animals and plants, upon the cereals, fibres, minerals, fuels and other products of the surface of the earth or from within it. Therefore, in order to understand the problems relating to the geography of man, we must understand also the conditions which have determined the localization in the world of these other objects upon which man is so dependent.

Everything that is alive upon the face of the earth is influenced by conditions of climate, temperature, altitude, etc., as is man himself; hence, in studying the descriptive geography of these many forms of life, we are brought face to face with fundamental physical principles which apply to all. We must study these principles and their effects, both on the organic and inorganic features, and trace out the causal relations between physical and economic factors and the results as we see them. We study the cause when we examine the reason for the present conditions. We study the effect, when we arbitrarily discuss the location in space of the present features of the earth without any reference to the reasons therefore. The rational method is to study the causes and the effects in their relations.

Considering then that geography is primarily a study in which cause and effect can be emphasized in their relations, what shall be our aims? and what shall we strive to give to the child?

We have in the study of geography, as in every science, two classes of materials to deal with, facts and principles. Our facts, we must observe, carefully, critically and fully. Our principles we must draw by generalizing many facts and the proof that our labor is good is to see if the principles we have inferred from our observations in one place can be made to explain what we observe in another. We cannot hope in any science to make a complete study of the subject matter of that science; and certainly, we cannot hope in geography to make a complete study of the earth or to give the child all the information known about the earth at the present moment. We must aim to give a certain amount of information; but we should aim above all, to give the ability to gather information; in other words, we should develop the knowledge of principles through the knowledge of facts. cannot expect every child to be a philosopher, and we cannot expect them in the early years to see clearly and without introduction that facts are related to principles. We must in our early work study facts not singly and in a separated manner, but in their relations in time and space so as to lead the child to appreciate that there are one or more underlying truths which make the explanation of the fact easy; then we can generalize. We must show the child by numerous and familiar examples that generalizations are legitimate and that they are but short handed ways of summarizing our knowledge which for lack of time we could never give fully in a school curriculum. If we develop in the child the ability to discover and apply principles, we give him the power to gain knowledge, and not merely unrelated items of information. His information may be forgotten in a day, a week or a year; but the power to use his own mind, to observe, to analyze and generalize the conditions about him, is a power that will go on increasing in use and will be ever helpful to that child through his life. will be the ever open window whose vista is continually widening with the advance of years, and through which the child will get the most beautiful, the most helpful and the most pleasing knowledge of the world about him. We must, therefore, aim to make the child think. We cannot arbitrarily lead him up to a principle which we have worked out for ourselves and make him accept it. We must make him see the reasons on which we have founded the principle. Then he will accept it; and will, later, learn to apply it.

If our aim, therefore, is to develop principles and give a child a better working knowledge of himself, we will at once make the child inquisitive in a rational way; will make him more intelligent, more interested in the conditions about him. If he can be made to feel that the animal, the plant, and the man are all facts intimately inter-related with other facts and to be explained in their present positions and characters by one or more fundamental principles, he will have not only an interest in nature but a love for it. He will feel a certain kinship between all living things and himself; and the study of geography will come to be to him not simply the blind memorizing of individual items, but a science in which he sees a rational development and which gives to him not only an increased knowledge but an increased power to gain more knowledge. This last, is the primary object of all education.

If, then, our aim is to develop principles as outcome of facts, how are we to proceed? Are we to wait and bring forth those principles in the later years of the study of geography, or are we to attempt to bring them out in the earlier grades and prove the strength of our position by applying them in the later years? In other words, are we simply to observe and generalize without proving, or are we to follow the three fundamental steps which are followed by every thinker in science before he gives to the world the result of his thought? I feel that the latter course is the proper and best one. Therefore, the next point is, concerning the order of procedure in a course of geography in the elementary schools. My opinion, gained from trial and experience is, that we should aim in the first, second and third years of our geography work so to combine what is commonly known as nature study with the elementary principles of geography as to give the child an interested love for the world about him and to give him the fundamental facts so related that he can develop therefrom, by a process of reasoning, the simpler underlying principles of geography. By the latter part of the third year, and surely throughout the fourth, the child -

should be able to go from a study of his home locality to a study of the other parts of the world through a process of reasoning the exact opposite of that followed hitherto in his work. He should have acquired principles and should be able from the map of the globe to apply those principles and to prophesy the geographic features that he would expect to find in the continent under considera-For instance, having had something of a knowledge of 'the shape of the earth, of the shape of the land and its meaning, of climate and its effect, of the effects of mountains upon winds and the migration of man, he should be able to prophesy from the physical map of Asia where in that continent he would expect to find the people most numerous, the civilization better advanced, agriculture possible or impossible. He should be able to tell the effects of the great axial mountain system of Asia upon the country north and south of it. To those who would say that such prophetic work is impossible, I can say that my classes have done such work and with valuable training for the individuals.

Of course, we cannot expect a child at the age of nine, to be able to know or apply all the fundamental principles, but he can gain much from applying the elementary ones. If this course is followed, every child has for himself, under the guidance of the teacher, made two of the steps of the scientific development of a belief. He has observed, he has generalized; from his generalizations he has prophesied certain conclusions. The proof of his work depends upon examining the conditions and finding if they are such as he would expect. At this stage in the development of the geography of the continent, the descriptive part of the geography, together with certain collateral reading, should be given him. If the teacher has followed a wise and far-seeing course he has led the child in this way through such a stage of mental development and progress that he finds his conclusions as he would expect to find them, and thus gains confidence in the method of study and a greater desire to pursue the method to other continents and in more detail.

Such a teacher would have no need of arguing that geography gave rational training and good mental discipline. The pupils would be living proofs of the fact and their mental training thus gained would help them in other classes. I have seen pupils of

eleven years reason out right conclusions in geography, by such a method as I have suggested, with much more accuracy and far greater confidence, than much older pupils who had never had such training; who had been taught to remember, not think.

To my mind, the continents should be studied at least twice; the first time after the manner I have suggested, starting from the home locality and going to the foreign; and later, studied in more detail with an attempt to bring out the more inconspicuous and subtle principles that have determined the geographical conditions, and to develop a knowledge of the continents by comparison. This is the method suggested and used to a considerable extent in Germany, France and England. The following lines quoted from an article on Geographical Education in the Scottish Geographical Magazine for November 1896 and written by Mr. A. J. Herbertson, will state the same ideas in other words:

"The home region should be used to teach the first notions of geography and then these should be applied to unknown regions, first likenesses and then opposite conditions being noticed. Gradually general laws should be pointed out, but at first only as far as they are illustrated in the locality of the school. In treating the systematic geography of other lands, the teacher should reverse the process he has hitherto adopted. The maps and pictures of the unknown land should be studied systematically and the pupil led to discover for himself the salient features. He should constantly be brought to compare the strange land he is now discovering with the familiar; to try to find within his own ken in miniature or larger scale, something of the nature of this region or in marked contrast with it.

"It is necessary to treat geography differently in higher classes, to make it more intensive as well as more extensive. In a properly arranged curriculum, the earth surface will be studied at least twice; the second time more in detail and what is even more important with a profounder study of the general principles."

Finally, in summary it should be said, that the principal aims of geography are to give every pupil a knowledge of the fundamental principles of geography and a wholesome knowledge of the world as a whole, to give him power to investigate clearly and accurately for himself, and to give him such an interest in the

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world about him that he will be anxious to make such a study. He should be led to be self-reliant and independent of teacher and text-book. If some such method of progress as I have suggested is followed, I feel very sure from experience, that the pupil will gain a better knowledge of the earth, will have his facts better correlated and arranged, will be more thoughtful, will be more in love with nature about him, and will go out from his schooling with a broader and more sympathetic knowledge of the world and its features; by such a method the teacher can teach something besides geography; she can teach self-reliance, studiousness and the power to think.

RICHARD E. DODGE.

NOTES.

The Farthest North.—Dr. Fridthof Nansen, who has returned this last summer from his thrilling and hardy voyage toward the North Pole has added many points of interest to our geographical knowledge of this region. Going to within 261 miles of the Pole, 195 miles farther north than any other explorer he has won great His highest latitude was 86° 14′ N. His scientific results are many and memorable. He has found that the North Polar Sea to the north of Franz Joseph Land and Spitzbergen is about two miles deep, which seems to indicate no land about the Pole. The deepest sounding was 1,942 fathoms. He has further proved that no great land masses occur to north of Asia. He went beyond the limit of bird migration and beyond all signs of animal life. though fox tracks were numerous far out upon the ice, and at great distance from any possible land.

Nansen has discovered no new lands, but he has fixed definite limits to lands long known, and he has given us many definite facts about the cold, the moisture, the life and the character of the far north.

The Transvaal.—Mr. George F. Becker, of the United States Geological Survey, gives an impartial account of the recent troubles in the Transvaal in the November number of the National Geographic Magazine. He describes the country which lies between the Limpopo, or Crocodile River on the north, and the Vaal River

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on the south, as an elevated plateau most of which reaches an altitude of 4,000-6,000 feet. The divide between the two main rivers is a region of upturned hard rocks, known as the Witwatersrand, which trends nearly east and west. This range is one of the principal gold bearing regions of the republic.

The rainfall of the region averages about thirty inches, and the climate is mild. Yet the soil is only moderately fertile. The country is very rich in iron and coal as well as gold, and the economic future seems to be very promising. There are five districts that yield gold at the rate of \$100,000 annually. Estimates show that within twenty miles of Johannesburg there are workable mines that will yield 3,500 million dollars of gold. By comparison it is interesting to note that the United States in 1895 produced \$4,900,000 more gold than the Transvaal.

The Boer colonists who oppose the advance of the English into power are described as follows: "Like the English they are stubborn, self-reliant, fond of the chase, and admirably adapted to cope with the difficulties incident to colonization in a country occupied by savage beasts and still more savage men. The Boer ideal seems to be life on a large estate, with plenty of sport and the occupation . of not too exigent stockbreeding and farming. So far their tastes do not differ greatly from those of many Englishmen, but they are for the most part ignorant of the refinements of life so dear to ad-'vanced Anglo-Saxons, and perhaps on this account they are almost devoid of the commercial instincts through which such tastes might be gratified. They are, it is said, usually able to read print, but for the most part their reading is confined to the Bible. highly religious, and the Bible appeals to them as to few other peoples, because the scenery and material conditions of the Book are so similar to those by which they are surrounded. The very animals are the same. Their religion is somber and puritanical. is that of the Old Testament, with little sweetness or mercy in it. Under normal conditions the Boers are generously hospitable and they are brave. It is true that Englishmen have sometimes reviled them as cowardly, but their whole history, and particularly the battles of Boomplaata and Majuba Hill, show the contrary. accusation seems to be due in part to the fact that like all continental Europeans they are greatly averse to fisticuffs, and partly

to the fact that in fighting with rifles they avail themselves of cover whenever they can. Taking advantage of cover I understand to be a well-established principle of all modern tactics."

The greatest known ocean depth.—It is an interesting fact that all the greatest known ocean depths are close to land masses. The deep spot in the Atlantic just north of Porto Rico reaches a depth of 4,561 fathoms; the great depression in the Caribbean known as Bartletts Deep, is 3,428 fathoms deep, and the mountains of Cuba, not fifty miles away, rise 28,000 feet above the submarine valley.

Until recently the greatest known ocean depth was that of the Tuscarora deep northeast of Japan, where soundings of 4,655 fathoms have been taken.

The British Steamer Penquin has now found a still greater depth in the south Pacific, just southeast of the Friendly Islands. Soundings of 5,147 and 5,155 fathoms were obtained in lat. 28° 44′. S. long. 176° 04′ W. and lat. 30° 27′.7 S. and long. 176° 39′ respectively. This greatest depth is again like the others close to land. Though in this case the land is not a continent.

The Relation of American Mountains.—Geographies have long taught that North and South America were dominated on the west by one long and single mountain system extending from Alaska to Patagonia. In North America the mountains are known as the Cordillera or Rockies, and in South America as the Andes. Prof. R. T. Hill has now suggested in an article in the National Geographic Magazine for May 1896 that such a unification of these great mountain systems is not justifiable if we study their relation to other smaller systems about the Caribbean-He thinks that there are no features in common between the mountains to the north and those of the Central American region, and says:

"The axes of the two great North American and South American Cordilleras, the Rocky Mountains and the Andean system, if projected from their termini in Columbia and Southern Mexico respectively, would not connect through Central America, but would pass each other in parallel lines many hundred miles apart. The projected Andes would pass through Jamaica and eastern Cuba and continue east of the longitude of the whole Appalachian

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system in the direction of Nova Scotia; the southern continuation of the North American Cordilleras would cross the Equator in the Pacific, far west of Central America and the South American continent."

Crater Lake, Oregon.—The United States Geological Survey has lately published a special map and description of the famous Crater Lake in Oregon. The lake exists in the hollow left by the removal of the top of a volcano that once stood many hundred feet in height above the pit now occupied by the lake. After the volcano had been standing for a long time the top is supposed to have sunk into the molten mass beneath. Now we have in the crater of the old volcano a lake 2,000 feet deep with nearly vertical walls rising 2,000 feet above its surface. In the lake is a smaller extinct volcanic crater, known as Wizard Isle, the crater of which is occupied by a small lake.

The topographic map shows the depth, area and shape of the lake and the topography of the region round about. The fact that the streams flow from the rim away from the lake as they formerly flowed down the sides of the volcano is well brought out. Besides a text describing the region and its history, the report gives views of the walls of the lake and of a model of the whole region. The map deserves to be in every school, not because it illustrates this lake alone, but because it shows a type of lakes of which there are many examples in the world. Central France, Southern Italy and Hungary give us other examples of lakes of the same origin. Among those in Italy may be mentioned Albano, Nemi, Bolsena, Avernus, etc. The map may be procured for five cents by addressing the Director of the U. S. Geological Survey, Washington, D. C.

A Seasonal Inversion of Drainage.—Prof. W. F. Ganong, in No. 1 of the Occasional Papers of the Natural History Society of New Brunswick, gives an interesting account of a reversible river at the outlet of Lake Utopia in New Brunswick. He says:

"The lake empties into the Magaguadavic river by a thoroughfare, locally called "the canal," which is less than two miles long and of very uniform breadth, and occupies a break in the granite hills. Where the thoroughfare leaves the lake, however, it is between two remarkable long grassy and parallel points which extend

directly out into the lake nearly half a mile, thus carrying the entrance to the thoroughfare out that distance from the main shore. The extreme points are very low and muddy and sink gradually under the water to continue as shallows still further out into the lake; towards the main land, however, they become gradually higher, bearing marsh grasses, sparsely at first and farther in gradually more densely; then shrubs appear and finally trees.

"Along the thoroughfare the banks are muddy, but on the lakeside, especially that on the south, they are of sand, gently sloping and sweeping in a long curve to the main shore. It is plain that the points are growing out into the lake; and the whole appearance is precisely that of a delta, though of a reversed shape, at the mouth of a stream, not that of a lake at its outlet.

"But, in fact, the explanation of the phenomenon is extremely simple. This delta is at times the mouth of a stream. The relation of the lake to the Magaguadavic river is peculiar, and happens to be so adjusted that at a certain height of water both are on the same level, and there is no movement through the thoroughfare. the water rises after rains, the river rises far more rapidly than the lake, which has but a small drainage basin, and pours into it through the thoroughfare, dropping its sediment as it meets the These are the only conditions requisite for delta formation; the lake then washes up the sand or works it out from the shore on the outer face, completing the formation. It is not, it is true, the typical delta shape, but it is a delta morphologically. When the water falls, level is again established, and finally a flow out of the lake begins; but this is of clear water, and not strong enough to remove much of the sediment which has settled to the Perhaps the double flow has something to do with keeping a single channel open (instead of the several usual in deltas) thus determining the shape of the structure, but the abundance of room for the sediment in the deep lake, and the working up of the sand along the outer faces may also contribute to keep the channel single."

Map-drawing in Schools.—Mr. A. J. Herbertson presents some very sensible ideas on map-drawing in schools, in the Scottish Geographical Magazine for October, 1896, in the course of which he says:

"There is much discussion as to the value of map-drawing in schools. As has already been pointed out, mere mechanical copying is more or less wasted labor. The pupils must learn to make maps before they copy them, to feel the need for, and understand, each symbol before they use it. The objections to map-drawing by children disappear when the maps drawn are not laborious copies of the topographical map, but diagrams of distribution.

"The shapes of countries alter with the projection used in representing a spherical on a plane surface. Hence the absurdity of expecting children to know the exact shape of every country. The maps the children draw should be simplified as much as possible, and political boundaries should never appear on their maps until They should construct their own network of an advanced stage. parallels and meridians of straight or broken lines, and the coast, river, mountain, and other lines copied should be simple curves. The edge of a plateau, for instance, might be indicated by a single broken curve convex to the shore, and the mountain range by a double line of curves with the concavities inwards. maps for copying are published (e. q. by Longmans and Co.), and should be used as samples more freely than at present; only the copy must not be a tracing, the maps serving merely as guides to the children in their drawing of the country.

"Children should not be confined to the drawing of maps showing topographical features. Climate and distribution maps of vegetation, animals, man, occupations, etc., should be drawn. Such maps are much easier to make than the political ones commonly copied by children at present, and in addition have some educative effect. A boy who can sketch from memory, in rough outline, a dozen maps showing physical features, the rainy and dry regions, the hot and cold regions, the desert, pasture and forest lands, the sparsely and densely peopled regions, etc., knows far more about its geography than the boy who can reproduce the sinuosities of coast and river, and the intricate zigzags of political boundaries. The true geographer is he who has a clear comprehension of all the parts and aspects of a country, and their relations, not he who has merely a minute knowledge of the names of its natural features and artificial boundaries."

Floods in the Mississippi.—One of the interesting geographic

questions in this country is concerning the future of the Mississippi alluvial plain, if the spring floods should become greater, through the cutting of forests around the headwaters of any large tributaries or for any other reason.

Mr. James L. Greenleaf in the American Journal of Science for July 1896, says it is fortunate for dwellers in the lower Mississippi that floods in all the tributaries do not come at the same time. Were the floods simultaneous he concludes that the great river would have to carry 3,000,000 cubic feet of water per second to the Gulf. Owing to the fact the Ohio flood usually leaves the river before the arrival of the Missouri flood the largest flood discharged into the Gulf probably does not exceed 1,800,000 cubic feet per second.

The Question of the Oxus.—Geographers have long discussed the possibility that once the Oxus or Amu Daria River flowed west into the Caspian Sea instead of north into the Sea of Aral as now. If there be such a path and it could once more by artifice be made a water highway, a great commercial route well into the centre of Turkestan would be established.

The economic importance of such a possibility is very great. A Russian expedition started in September 1896, to explore this country to find out if a water route along this supposed path would be more or less costly than a railway.

Southeast of the Sea of Aral in the same basin is the Lake Sari-Kamish. This basin is separated by a divide of considerable height from the basin of the Uzboi; which latter basin has long been considered the former outlet of the Amu Daria, to the Caspian.

Recent work by Russian geologists, reviewed in the Annales de Géographie for October 1896, has shown that owing to the height of the divide spoken of above it can not be presumed that the Amu Daria flowed along the path of the Uzboi, and incidentally the author remarks that the making of such a water route as is suggested is impractical. The author considers the Uzboi depression as a torrent valley cut by the water rushing out from the Aral-Sari-Kamish basin, when the lowering of the whole country allowed this region to be drained into the enlarged Caspian Sea which then extended to the edge of plateau of Kara-Kum.

Pacific Ocean Currents.—"Dr. Cäsar Puls contributes an elaborate discussion, based on original records, of the surface temeratures and currents in the equatorial belt of the Pacific Ocean to the Archiv der Deutschen Seewarte (Hamburg, XVIII., 1895, 1-38 with 12 monthly charts). The chief interest attaches to the equatorial counter current, which maintains its eastward course all across the ocean between the wind-driven, west-flowing equatorial currents on the north and south, the latter being much the stronger of these two. The north equatorial current, from 9° to 20° N., is strongest in March; it is not altogether supplied at its east end by the weak southward current along our west coast; it receives much water from the counter current which turns northwest at its east end, and not southeast, as ordinarily mapped. At the west end of the north equatorial current, part turns north to flow past Japan and a lesser part south to join the counter current. The greater south equatorial current, from 12° S. to 5° N., is strongest in September, and has its highest velocity along its northern margin, sometimes over 100 nautical miles in 24 hours. It is largely supplied by up-welling water along the west coast of South America, where the wind blows off-shore; the Humboldt surface current is not sufficient to feed it. Part of this great equatorial current turns south before reaching the Solomon Islands; the rest passes on north of New Guinea and turns sharply back at the 'root' of the counter current, except from December to May, when this branch is turned back on itself by the northwest monsoon then and there prevalent, forming a short counter current south of the equator. The north counter current, extending all across the ocean is said to be much influenced, but not produced, by the winds. Near its west end it is favored for three-quarters of the year by the southwest monsoon; and from July to October, when it is, as a whole, strongest and broadest, its east half is favored by the narrow belt of monsoon winds there and then oc-It is narrowed and weakened in our winter, when . these favoring winds are wanting, and from January to March, under the extended northeast trade, it may be stopped or locally reversed; but where and whenever these adverse winds weaken or shift, the current reappears, and sometimes with increased strength. Yet, as a whole, it is regarded as a compensation current, dis-

charging eastward the excess of the wind-driven south equatorial current, which has no sufficient escape at its west end."—Science.

Alaska.—The present great interest in the mineral resources of Alaska makes the following, notes taken in part from an article in the Scottish Geographic Magazine for November, 1896, most helpful.

All the region to the north of the 56th parallel and to the west of a line three marine leagues from the coast; and above about 61° to the west of the 141st meridian, belongs to the United States. This region is rich in gold and other ores, and the workings on the Upper Yukon and at Juneau are well known. Recent work by the commission establishing the boundary line between Alaska and the British Possessions shows that the larger area of great mineral value probably belongs to Canada.

Taken as a whole, Alaska has more seacoast than all the rest of the United States on the Atlantic and Pacific, not including the Aleutian Islands. The principal means of entering the interior is by the great Yukon river, which usually opens for navigation in June, and is 8 miles wide at Fort Yukon. stream is navigable 850 miles, and enters the sea through several mouths, no one of which is more than 8 feet deep. Yukon is to be counted as having one of the famous deltas of the "For hundreds of miles from the sea the Yukon flows through low level tundras, or mossy morasses resting upon a foundation of clay. The shifting current of the river eats away the shores on either side with astonishing rapidity, the dull thud of caving banks is constantly heard by the traveler. Stepping upon the shore the explorer must jump from hummock to hummock or wade around from knee to waist deep. In many places the ice never disappears within a few inches of the surface, being protected from the rays of the sun by a non-conductive layer of sphagnum.

"Wherever there is a slight elevation of ground in all this watery waste the wretched natives have located their villages; the dwellings consisting of excavations in the ground roofed over with mounds of sod. Here they fish during the summer and hunt the musk and moose in the winter."

Indiana.—"Outside the New England group there are but five

States in the Union smaller than Indiana. Although one of the lesser States, Indiana has very little waste land. Her 36,000 square miles are well watered by streams and lakes. There are no mountains within her borders and no high hills, except those along the Ohio River. Almost all the State is situated in the Mississippi Valley. The soil is fertile and adapted to all the cereals and grasses grown in this climate. Though touched on the north by Lake Michigan and on the south by the Ohio River and on the west by the Wabash, yet the State is penetrated by no navigable stream.

Our State is rich in minerals, coal, building stone, iron, natural gas and oil. The extent of the gas-fields is said to exceed those of Pennsylvania and Ohio combined. Our coal fields cover 7,000 square miles. Coal is found in twenty-four of our ninety-two counties. Our mineral springs are unrivaled for medicinal purposes. Indiana has extensive quarries of excellent limestone and sandstone. This stone has been recently used in some of the finest public buildings and residences in the United States.

Three-fourths of the State was originally covered with forests. It required twenty-five years' unrestrained destruction of trees to clear out two hundred thousand farms. About one-fifth of the state is still covered with timber, which is now worth more than the land on which it stands. Our forests contained, originally, all the varieties native to this climate. Next to the soil and minerals, timber was, perhaps, Indiana's greatest source of natural wealth.

The population of the State in 1890, was 2,300,000, and our State now ranks eighth in the Union, in respect to population. The center of population of the United States is located about fifty miles south of Indianapolis."—Inland Educator. Dec., 1896.

REVIEWS.

The Century School Supply Company, of Chicago, is selling a series of geographical illustrations, of which two transparencies are especially helpful and suggestive. These show the seasonal positions of the planets and the changes of the tides in reference to the relative positions of sun, moon and earth. They can be procured apart from the rest of the set.

The remaining parts of the set are, on the whole, more harmful

than helpful to the child, for they present features not true to nature and congregated in an impossible way in one small region.

The attempt is made to illustrate geographic definitions by taking imaginary excursions, a method now out of date in the best schools. We need to train the eyes as well as the ear, but let our attempts be true to nature and not productive of conceptions worse, perhaps, than none.

Man and his Markets. A Course in Geography. By LIONEL W. Lyde, M.A. Pp. x+186. Illustrated. The Macmillan Co. 1896.

Under the separate chapter headings of "Environment," "Birth of a City," "Bread and Milk," "Flesh and Fish," "Coal and Wood," etc., Mr. Lyde has grouped together a mass of suggestive material that should be helpful to the teacher of comparative or economic geography. The chapter, for instance, on Environment states in a very elementary way some of the effects of natural geographic conditions on peoples. The influence of mountains, indented seashores, plains, deserts, etc., is quite clearly stated, though not in as detailed a manner as one would wish. The conditions favoring the building of a city are summarized so as to be helpful to one who has never tried to bring together in one statement all the more important geographic and social determinants of the development of large centres of population.

Unfortunately there are many instances in which the items given are not strictly accurate and hence the book cannot be used in its entirety. The illustrations are, with few exceptions, of an inferior quality and not at all helpful. Many are drawn from the ideal and not from actual conditions and are worse than useless.

The book would be of a fair amount of assistance to a teacher, but is not of a kind to be placed in the hands of the pupils.

The Werner Introductory Geography, price 55 cents; and The Werner Grammar School Geography, Parts. I. and II. Price \$1.40. By Horace S. Tarbell, A.M., LL.D. Werner School Book Company. 1896.

The Introductory and Grammar School Geographies recently published by the Werner School Book Company, can hardly be said to "leave nothing desired;" but it can truthfully be said that

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they are perhaps the most usable geographies in the market, both from the standpoint of pupil and teacher. Both books are to be complimented for their order of arrangement and for the interesting tone in which they are written.

In the primary book sufficient emphasis has not been placed upon home geography to allow the pupil to use his ideas, gained at first hand, to be the basis of further study of foreign conditions. The manner of heating the earth is well given and the conclusions and effects well applied. The relief maps are confusing for they are not clear cut. On the whole the illustrations are poor, because their proportions are not true and because they are many times drawn from ideal rather than actual conditions. The maps are good. Above all, the book is to be complimented for the rational way in which the commercial and human sides of the science have been brought out. Much more could have been suggested as to how the pupil should be taught to reason out conditions, but the book is a laudable attempt in the right direction.

The most striking feature of the grammar school book is the division into two parts (not sold separately); one part containing the text and the other the maps and illustrations. Such a division is most commendable, for most of the grammar school geographies hitherto published have been too heavy for ready use and transpor tation by pupils. In part II. are grouped all the illustrations except certain small maps and sketches in the text. The maps are good but the special state maps have too many unnecessary names and too few commercial details. They thus seem dead. The illustrations are usually well chosen and well grouped, though perhaps foreign countries might have well been represented more fully as to their topographic conditions. It is to be regretted that the form of reproduction adopted was such as to blurr details and to take much from the beauty and meaning of the pictures.

In the text the subject matter is excellent and on the whole well arranged. The books open with too many unrelated definitions, which could be much simplified had the phenomena been described in their relation in space and time to other similar phenomena. It is to be regretted that the author has not followed the modern classification of land forms which, with only a little introduction of a physical nature, is readily and eagerly grasped

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by the average pupil above the third grade. As in the smaller book the consideration of climate is good and the commercial and human aspects of the subject excellent.

One criticism that can be applied to many books besides the one in hand is in regard to the manner of quoting references. The list given is a well selected and valuable one, but the prices and publishers are not given as they should be in all books. Teachers far removed from other sources of information would find great assistance, in ordering books for collateral reading, could they have these necessary details all in one reference.

On the whole Dr. Tarbell has done his task well and has answered the requirements of the Committee of Fifteen more perfectly than anyone else. We may repeat, as the best compliment that can be given, that the books are readily usable by both teachers and pupils, and this is unfortunately not true of all the newer books on this subject.

The Connecticut and Rhode Island State Maps.—Prof. Wm. M. Davis of Harvard University has prepared two reports upon the State Maps of Connecticut and Rhode Island as aids in the study of geography in grammar and high schools. These reports can be secured from Charles D. Hine, Room 42 Capital, Hartford, Conn., for Connecticut; and Thomas B. Stockwell, 104 North Main street, Providence, R. I., for Rhode Island.

Each report describes the plan of the state map, gives suggestion for the study of local areal features, taking up the primary geographic forms in detail and considering their relation. Final paragraphs consider the relation of man to the physical features of the state and suggestions are offered for further observation in a similar line.

These reports should be in the hands of every geography teacher in the states treated. The author is willing to supply a limited number of these reports on application.

New York State Map.—Professor Davis has also prepared a report on the New York State Map similar to above for Connecticut and Rhode Island. This report is published by the Regents of the University of the State of New York, and will be sold for five cents a copy, when issued. It is promised for January 1, 1897, and application therefore should be made to the Board of Regents of the University of the State of New York, Albany, N. Y.



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THE INFLUENCE OF THE APPALACHIAN BARRIER UPON COLONIAL HISTORY.

History shows us by repeated instances that the geographical conditions most favorable for the early development of a people are such as secure to it a certain amount of isolation. reason, a highly articulated continent like Europe has proved a forcing-house for nations. Almost every people there has grown up, shut off from its neighbors by barriers of mountain or sea. Confined to a limited area, protected from without by bulwarks of nature's own making, population increased rapidly and civilization moved with strides under the strongly interactive life. The people soon filled out their natural territory, then began to crowd it, pressing upon the limits of subsistence, and perfecting their political and social organization in the effort to avoid the friction incident to greater density of population. Local life grew in intensity and the sense of statehood was early developed. creasing industrial and commercial activity endeavored to supply from abroad the deficit of food for the growing number of consumers; while the population, already redundant, began to expand beyond its natural environment and overflow into other lands.

Of the three leading colonizing nations which came to North America from Europe, one happened to discover and settle the only part of this continent which could afford geographic isolation in any way approximating that which it had enjoyed in Europe. That people were the English. At the end of the first century of permanent settlement they found themselves in possession of a narrow strip of coast, shut off from the interior of the country by an almost unbroken mountain wall. Sea and water-shed drew their boundary lines, and constituted at the same time their frontier defences. Only one border was really open, that to the south along the Spanish possessions in Florida. The English were therefore in a naturally defined area, isolated enough to lend them the protection and cohesion which colonial life so much needs, affording the long line of coast which could give to this maritime people its most favorable environment, large enough for growth and strength, but small enough to secure concentration and to guard against the evils of excessive expansion. Beyond this seaboard country lay the great valley of the continent, shut in by the upheaved masses of the Appalachian and Rocky Mountain systems, a vast basin unbroken save by the faint traceries of its winding Here nature offered no obstruction, afforded no protecstreams. The two natural highways into this country, the St. Lawrence on the east and the Mississippi to the south, came, by the chance of discovery and exploration, into the hands of the French, and consequently gave them control of this extensive territory. It proved, however, too large for them to hold; the very extent of it scattered their population, tempted to the adventurous, half-nomadic occupation of the fur trader rather than the sedentary life of the colonist. Here were seen fortified trading-posts instead of the agricultural villages which dotted the seaward slope of the Alleghanies.

The beginning of English colonial enterprise in the New World followed right on the heels of the loss of Calais. The idea of a balance of power was even then looming up in the national consciousness. For England the hope of regaining her continental possessions had gone glimmering. Her only chance now was to make the loss good in foreign lands; hence the government encouraged all colonizing ventures. The small island kingdom was already experiencing the evils of over-crowding. The people who came to the New World realized that here was a chance to make

a living; and in so far their motive was wholesomely selfish. They went to work accordingly to get an industrial hold on Amer-The narrow strip of land between the Atlantic and the mountains favored and strengthened their purpose. The Appalachian barrier narrowed their horizon and shut out the great bevond; it took away the temptation to wide expansion which was defeating the political aims of the Spanish and the French and transformed the hunter into the farmer, the gentleman adventurer Territory that is held industrially in all into the tobacco grower. its extent is held strongly. The less dispersed the population, the fewer are the avenues for invasion and the more solid is the front which the country presents to attack. The mountain wall gave to the thirteen colonies a certain solidarity which they would not have otherwise possessed—a solidarity which fought for them in the Revolution.

The Appalachian system which presented such an insuperable barrier to the early colonists extends from the Saddleback Mountains of Maine to the pine covered hills of Georgia. It consists in general of parallel ranges, altogether some three hundred miles in width, which stretch along with only one considerable break in all their length of thirteen hundred miles. A mantle of primæval forest, with a singularly dense undergrowth, contributed further to make them impassable. The backwoodsman had fairly to carve a path for himself through this wall of living green. In consequence, the tidewater country had its long established colonies before anything of the mountains was known. The rivers flowing down the eastern slope were not navigable and, therefore, did not afford ready access into the interior; but when followed to their head waters they were found to disclose excellent passes. This was especially true of the southern portion of the system, but even here the disposition of the passes involved long, circuitous routes to reach the western slope; for one range passed, the next one presented a similar barrier and the longitudinal valleys in between had to be traversed before another gap could be found. These trough-like valleys, therefore, became natural highroads and had a pronounced effect in the distribution of the population when it finally began to move towards The Scotch-Irish emigrants from Pennsylvania found themselves landed in western Virginia and Kentucky; and those

from Virginia followed these depressions southward into Tennessee. The Pennsylvanians gained access to the Ohio by the west branch of the Susquehanna, and also by another route further south from the Juniata to a tributary stream of the Allegheny. The Virginians, though, found a more direct way up the valley of the Potomac and thence by a short portage to the Monongahela. Among the broken hills of the extreme end of the Alleghanies, an almost level route was frequented by the traders from the Carolinas and Virginia seeking the Cherokee villages; it was known from the earliest times, but had only a limited use, because it was too remote from the northwestern Indians who commanded the all-important fur trade.

The only important break in this mountain wall was to be found in the natural depression of the Hudson and Mohawk valleys, where the pass into the interior is only about one hundred and seventy-five feet above sea level. Significantly enough we find an English settlement as far inland as Schenectady as early as 1661. This route was also able to tap the northwestern fur trade. then in the hands of the French. Furthermore, trails led from the Mohawk and Genesee to the upper Allegheny, and thence to the Ohio and Mississippi. For this reason it became apparent at an early date that the Mohawk and Hudson valleys formed the key to the Northwest, as the meeting place of the Allegheny and Monongahela was in reality the "Gateway of the West." the geography of eastern America, therefore, these rivers were cut out for battle grounds in all colonial wars between the English and the French, just as the head streams of the Po have been the scenes of conflict in every invasion of Italy from that of Hannibal to that of Napoleon III.

The French, who felt that the heart of the continent was in jeopardy, kept a sharp eye on these avenues to the West. They could attack the English most easily along the Mohawk Valley, and at the southern end of the mountains, but at both these points the English had a buffer state between themselves and the enemy in the Iroquois tribes in the north and the Cherokees in the south, both of which nations were attached to British interests. The chronic jealousy between the French and English took an acute form when the French discovered that the Mohawk valley was

getting too large a share of the northwestern fur trade. Consequently, by a long series of wars, they endeavored to drive the English out of this region altogether. The enemy were at a long distance from the middle and southern colonies, which were further guarded by the wall of the Alleghanies, so that, with the exception of one or two sporadic attacks, they were left undisturbed by the struggle going on to the north of them. On the colonies along the Hudson and in New England, though, the attacks were almost incessant. In the French and Indian War nearly every foot of the upper Hudson was fought over as far as Lake Champlain, and the route up the Mohawk to Oswego was almost as bitterly contested. This history repeated itself in the Revolutionary War, when the valley of the Hudson made the geographical line of communication between Canada and the British fleet on the colonial coast, while at the same time forming the land connection between New England and the other colonies. Both in the French wars and in the Revolution the Six Nations who inhabited this region rendered valuable aid to the British. In the earlier wars, particularly, the fact that they occupied a strategic position gave them a power and importance out of all proportion to their numbers.

The British early ingratiated themselves with the Iroquois and Cherokees, that they might have these Indians as outposts against the French. But the rest of the tribes on the seaboard were not treated with any undue consideration, for they were not a numerous and therefore not a dangerous enemy; and they were prevented by the mountains from making any combination with the far more populous tribes of the Mississippi Valley. The bodies of savages with whom the settlers had to contend were small. Indians of New England were actually exterminated in King Philip's War. The Delawares were dislodged from their original home and emigrated beyond the mountains. The Tuscaroras were made to evacuate their holdings in North Carolina. Living in the narrow area of the tidewater country, it was unavoidable that the Indians should soon feel the encroachments of the whites; and it was equally certain that they would suffer defeat when it came to a conflict, in consequence of the weaknesses of the tribes. tunately for the young colonies, the Alleghanies protected them against the depredations of the wild, half-nomadic Indians of the Northwest, and of the fierce Appalachian tribes of the southern Mississippi, both of whom were far more numerous than the Indians of the coast.

Hemmed in thus by the mountains, for the first one hundred and fifty years of their occupancy the English settlers were limited to the tidewater region of the Atlantic coast. This seaboard country presented in its different portions different aspects, which had a corresponding effect upon the colonists. In New England the Atlantic plain is only from fifty to eighty miles wide, but it gradually broadens as it continues southward, till in the Carolinas the mountains are two hundred and fifty miles back from the sea. The area adapted to settlement was, therefore, more extensive in the South than in the North. Furthermore, the northern district had suffered glaciation; it was covered with a heavy deposit of boulders which had to be removed at the cost of infinite labor before the land was ready for cultivation. The hardest work had to be done before a plough could be used; but this once over, the soil could be tilled for a long time without giving signs of exhaustion. This fact, together with the small area at their command, preserved to the settlers the contracted territorial ideas which they had brought with them from the Mother Country, and served to root them in the soil. Consequently the people of New England developed none of the tendency to expansion which later became a characteristic of the American people.

That tendency developed further south. Here the larger unobstructed area invited it, and the leading occupation of the settlers—tobacco culture—made it a necessity. At a time when artificial manures were unknown, the production of the better kinds of tobacco demanded a virgin soil. The planters were, therefore, led to take up as large tracts as possible. The only preparation was "girdling" the trees, the primitive mode of clearing the land which the colonists learned from the Indians. Land so prepared was planted in tobacco for three years, and afterwards in corn. The method of cultivation was superficial and the materials taken from the soil were never replaced. By this system of agriculture, the evils of which were further accentuated by slave labor, low lands were exhausted in eight years, fields less favorably

situated in three. Ceasing to yield, they were abandoned and allowed to revert again to a state of nature. Philip Bruce, in his Economic History of Virginia, cites a statement, made in about 1700, to the effect that at that time, "although the population of Virginia did not exceed the number of inhabitants in the single parish of Stepney, London, nevertheless they had acquired ownership in plantations that spread over the same area as England itself." Thus developed that spirit of expansion which, early in the eighteenth century, led the settlers to hammer at the gates of the mountain wall on their western frontier and to resent the claims of the French that the British possessions were limited by the crest of the Alleghanies. It was, therefore, not a matter of chance that the first protest against the French forts on the Ohio was made by a Governor of Virginia.

Men like Byrd of Westover and Governor Spotswood appreciated the character of the mountains as a bulwark against the enemy and realized the necessity of making themselves masters of its passes before the French should do so. They knew that their expansion over those mountains was inevitable; therefore the seato-sea claims of the English were to them of vital importance. This view was shared also by the colonists of Pennsylvania and New York because they, too, lived under similar conditions of expansions; but the people of New England, on the other hand, were indifferent to the disposition of the western country. They seemed quite satisfied with the line of the Alleghanies as a boundary, if the trade with the western Indians could be secured. Their standpoint was therefore provincial, in contrast with the continental conceptions of the middle and southern colonies.

The policy of the latter prevailed and the whole line of settlements from Maine to South Carolina were levied on for its support in the French and Indian War. This was the first time in their history that all the colonies acted together; this was the first time that there was a common American interest at stake. Hitherto none had combined, except the New England colonies, where the geographical conditions made for greater density of population, and a certain degree of isolation emphasized their community of interests. The southern colonies, with their widely scattered plantations, did not at first have much to do with each other

or with their northern neighbors. Blocked by the mountains in their growth towards the west, however, they were finally compelled to expand laterally and fill up the stretches of forest which originally separated them. The effect of the Appalachian barrier was therefore to keep the population within clearly defined limits and lend it that density which means strength. Shaler, in his Nature and Man in America says that in 1700 "it was possible to ride from Portland, Maine, to southern Virginia, sleeping each night in some considerable village."

With the rapid increase of population characteristic of colonial life, the limited extent of the country which would repay cultivation, and the, in general, wasteful methods of agriculture, it was to be expected that the supply of arable land would soon be exhausted, and the activities of the colonist necessarily directed into other channels. This condition was reached first in New England, so that its people were early forced into industrial and maritime enterprise. Manufactories for the most common articles of consumption were established; the forests were levied on for shipbuilding, and American vessels were soon doing all the carrying trade between the colonies.

The Appalachian Barrier had the effect, therefore, of making the colonies a purely peripheral phenomenon. It limited them to a strip of coast, where they were most easily retained under British domination. If they had expanded at an earlier date to the west, England would have found it a much more difficult task to make her power felt over all the area settled. The mere element of distance in a new, unbroken country would have complicated greatly the machinery of government, while diminishing its efficiency. Furthermore, it would have generated in a larger proportion of the population the spirit of the frontier, that is, the spirit of independence. Disaffection towards the Mother Country would have developed slowly as a chronic disease, increasing in intensity towards the west; and we may think it would have been a long time before the feeling could have gathered strength to break out As it was, held under the thumb of the British govin rebellion. ernment, disaffection took on the form of an acute attack, and rapidly ran its course from protest to rebellion, from rebellion to independence. More than this, when the conflict did come the colonies were all of one mind, no matter from what section they came; there was no disaffected West and loyal East, as might have been the case under other geographical conditions. The spirit of union that animated them can be attributed in no small degree to their close contiguity, while their occupation of a contracted area with their two and a-half million population enabled them to operate in a solid mass against the enemy. They braced themselves against the mountains and fought towards the sea. The bulwark at their back protected them from the onslaughts of the western Indians who were stirred up to hostility by the British agents. Only the few settlements beyond the mountains in Kentucky and Tennessee were exposed to this danger; but, as they were debarred in general from participation in the eastern campaigns against the British, they could give the Indians their undivided attention, and that with highly gratifying results.

For a hundred and fifty years the American people were dammed up against the mountain barriers. The British government, taking its cue from the natural features of the country, forbade all permanent settlement beyond the water-shed of the Alleghanies, for the purpose of keeping the western country as a reserve for the fur trade. Furthermore, the political supremacy of the Mother Country, combined with her selfish commercial policy towards the colonies, operated to keep the population confined to "the Europe-fronting shore." But the energies aroused by the prosecution of a successful war, and the snapping of the cords which held the colonies in leash to England, enabled the mass of American life to widen the old breaches in the mountains and rush down to the Mississippi valley and beyond, till in half the time it had taken the people to reach the crest of the Alleghanies they were planting their towns on the genial coast of the Pacific.

ELLEN C. SEMPLE.

LOUISVILLE, KY.

METEOROLOGICAL OBSERVATIONS IN SCHOOLS.

Meteorology, or the science of the atmosphere, is a subject that has not been as well or as much taught in our schools as its interest and usefulness fits it to be. Many teachers have hesitated to attempt the study because of lack of preparation for the work. Much can be done, however, in a simple way, in the study of the weather elements, and the purpose of this paper is to offer some suggestions of a practical nature to those who would be willing to undertake the elementary consideration of the weather and its laws.

There is surely no need to explain at length, on this occasion, the great practical interest and importance of the subject of meteorology; to show how readily it lends itself to teaching, or to set forth how much even an elementary knowledge of it does to make our daily life more interesting. One who knows something of meteorology sees in our ordinary daily weather changes, which to most persons are merely a succession of fair and foul days, constant opportunities for study and ever-recurring examples of the working of the same great physical laws. To such an one the weather ceases to be a tiresome, though most convenient subject of conversation; it becomes an ever-widening field for research. Whoever has given this matter even the most casual thought is aware of these facts. The task for him who wishes to improve and extend meteorological instruction in our schools is not now to argue concerning the importance of his subject. The subject can be left to do that for itself. It is rather to make suggestions that may be of assistance to those who have already begun to teach meteorology, as well as to those who are only waiting for such suggestions in order that they may also begin.

Instruction in meteorology may well commence in the earliest school years, and no teacher need feel that her scholars are too young to make this beginning. At the start the task of the teacher is a very simple one, for it consists only in talking to the children about the weather conditions and changes from day to day, and in asking them a few questions. These changes they unconsciously notice as they come to school, as they go out at recess and on their way home. They cannot help noting that the day is hot or cold, wet or dry, but they do so unconsciously. It is the part of the teacher to draw out from the children the facts as to the weather characteristics of each day, to call attention to important phenomena they have not seen and to lead them to become interested and intelligent, instead of blind and unconscious observers. These preliminary steps are by no means to be con-

sidered unimportant or useless. In the hands of a teacher who undertakes this work with interest the children will very soon become trained in intelligent non-instrumental weather observation; they will become familiar with our principal weather types; they will appreciate our larger seasonal changes; and the brighter ones may be able to make simple weather forecasts for themselves, based on wind direction and the condition of the sky. Only a few minutes a day need be given to this work, and it can well be taken just before school or at some other odd moments.

This simple method of gaining an appreciation of some of the fundamental facts of diurnal and seasonal changes is an important step towards a rational understanding of the larger facts of meteorology, to be learned later. It should be followed by observations with instruments, but should by no means be altogether discontinued when the instrumental work is begun. On the contrary, the more extended the latter the more complete and accurate should the former be.

In simple instrumental meteorology, such as can be taken up in the lower grades of any grammar school, there is to be found a most attractive and useful addition to the other school studies. The work is of a different character from the rest, and therefore affords recreation as well as instruction. It requires, if well done, punctuality in taking the observations, neatness in keeping the record, and accuracy in making the readings and finding the aver-Indeed such work gives admirable training entirely apart from the benefit derived from the meteorological knowledge thus gained. It is well to begin with very simple records only, such as temperature, wind directions and velocity, and rain or snowfall. Current observations without the use of instruments should be made in addition to instrumental records, and both sets should be carefully preserved. Such non-instrumental observations should include the state of the sky (clear, fair, cloudy); the kind of precipitation (rain, snow, hail); the time of beginning and ending of the precipitation, and any other notes as to phenomena of interest that may occur.

Temperature is measured by means of the thermometer. For this work a good mounted mercurial thermometer, costing \$2.00 or \$3.00, should be secured. Cheaper instruments are usually very inaccurate and are not worth the time spent in reading them. The thermometer ought, if possible, to be hung in an ordinary lattice-work thermometer shelter, away from buildings, and about four feet above a grass-covered surface. If this is impracticable, as it very likely will be in most cases, it will do sufficiently well to have the instrument fastened outside of a north window as far away from the glass as is possible, allowing for the scale to be read from the inside. The window should never be opened before making the reading.

Wind directions may be taken from a neighboring vane, but care should be exercised to see that the vane is in good working order and swings easily. There is no simple and inexpensive instrument adapted for school use, which gives the velocity of the wind, so that it is usually possible only to estimate the velocity roughly as calm, light, moderate, strong, gale.

The amount of rain or snow may be very roughly ascertained by means of an ordinary tin can, with a sharp, clean-cut upper edge, placed on level ground away from buildings and trees, and fastened so as to prevent its blowing over. A foot rule marked off into inches, halves, quarters and eighths may be used to measure the depth of water in the can. The amount of snowfall is difficult to measure in any form of gauge. It is often easier and more accurate not to try and catch the snow in the gauge, but, selecting some flat space where the snow has not drifted, to press the inverted can down upon the snow, cut out a circular section of snow of exactly the diameter of the gauge, and then melt that quantity of snow. The depth of water produced by the melted snow is the amount of the precipitation.

These observations are most simple and crude, but they are well worth attempting if no better outfit can be provided. If the teacher and scholars are especially interested in the work, and if the means are forthcoming with which a more extended supply of instruments may be purchased, many others may be added. A standard rain-gauge, with its ingenious device for ensuring a more accurate measurement of the rainfall than is possible by means of the rude method above described, should be secured first of all. Then, instead of having only one "ordinary" thermometer, as it is called, a set of maximum and minimum and of wet- and dry-bulb

thermometers should be bought. The former register the highest and lowest temperatures which occur, and should be set every day, while the latter serve to give the dew point and relative humidity of the air. These instruments must be hung in a standard shelter, specially provided for them. A mercurial barometer is a most useful addition to the school-room, and any teacher who is fortunate enough to have one should see that the scholars make good use of it. The reading of a mercurial barometer is by no means an easy matter, and only the older scholars can be expected to use it with any approach to accuracy. The principle of the instrument ought to be thoroughly explained before any readings are made. Should there be opportunity, a Richard self-recording barometer and thermometer might also be added to advantage. These machines, made in Paris and costing about \$35.00 each, give continuous records of pressure and temperature. A pen, rising or falling with increase or decrease of temperature and pressure, is held against a sheet of paper placed around a revolving drum. drum is run by clockwork and the sheet is made to receive the record for one week. By a study of these barograph and thermograph curves, many interesting relations between pressure and temperature can be discovered and, if the curves are studied in connection also with the non-instrumental observations made from day to day, a large number of additional relations between wind direction and velocity and pressure, wind direction and temperature, etc., will be seen. The barograph has the great advantage that it can be kept indoors, for the pressure is the same within as without. The thermograph must, of course, be placed in the thermometer shelter out of doors.*

It is not the intention of the writer to explain the uses of these instruments. Any teacher who takes up this work is advised to secure from the Chief of the Weather Bureau, Washington, D. C., a copy of the "Instructions for Volunteer Observers,"

^{*}Standard Weather Bureau instruments of the kinds above mentioned, with the exception of the two last named, can be purchased of H. J. Green, 1191 Bedford Ave., Brooklyn, N. Y., at the following prices: Maximum and minimum thermometers, \$7.50 to \$8.75; wet and dry bulb thermometers, \$7.50; rain gauge, \$5.25; wind vane, \$8.00; anemoneter, \$22.50, with batteries and attachments complete, \$24 extra. The Richard barograph and thermograph can be obtained of Glaenzer & Co., 80 Chambers St., New York.

in which will be found minute directions regarding the care and use of all the ordinary instruments, the corrections to be applied to their readings; directions as to the construction of the thermometer shelter, etc.

The question will now be asked: When should these observations be made? This ought, so far as possible, to be left to the children themselves to decide. In all cases it is advisable to begin with the simplest instruments only (ordinary thermometer, wind vane, rain gauge), and, when the use of these is thoroughly familiar, if opportunity offers, some of the more expensive and more complicated ones may be added. The children will probably begin by taking only one observation a day, and that very likely in the morning, before school. The plan adopted in many schools, of assigning this duty to different scholars in rotation, is a good one. After the observation is made, non-instrumental as well as instrumental, it should be written upon the blackboard, so that all can see it. This brings the matter to the attention of all the scholars, and helps to keep everyone in the room interested. It is evident, of course, that one observation a day is not enough to give a fair average for the whole day, and the teacher can, by judicious question and suggestions, very soon bring the children to realize They will then wish to take more readings of the instruments, and very soon five or six, or even more, observations a day can be made. It is hardly necessary to state that one reading of the rain gauge a day is usually sufficient.

At the close of the school day the blackboard data should be entered in a record book, kept for that purpose in the school room. At first, when the observations are very simple, there will be need of only a few columns in the book, each column being reserved for one special weather element. Later on, if more extended observations are introduced, more columns will be needed. In all this work the teacher ought to see that there is a general progression, beginning with few and simple observations and gradually advancing to the more extended and complicated ones. Each grade, for instance, should have a certain number of instruments to read and a certain number of non-instrumental observations to make. The next higher grade should be given a little more to do, and so on. In time, as the more expensive instruments are added, a very com-

plete and well-graded course of observational work can be laid out, extending through several school years.

Some ingenuity can be exercised in devising the best scheme for arranging and keeping the record books, which should be carefully preserved in the school room, so that they may be referred to by the scholars of after years, if desired.

Wherever such observations as those briefly indicated here have been attempted, they have, so far as the writer's experience goes, been very successful. Punctuality and care are needed in making the readings of the instruments and in noting the general weather phenomena; accuracy is an essential in finding the weekly and monthly averages. The scholars have a certain feeling of responsibility when the observations are entrusted to them, which makes them attentive and precise. In fact, it is evident that in most cases where children have had such a training as this simple work gives them they have, as a result of it, become more careful and more punctual in their other studies.

As to the direct use of such work in the general education of the scholars there can be little doubt. Through it they are taught to keep their eyes open and to be alert to note the weather changes from day to day. They inevitably acquire a very considerable knowledge of ordinary meteorological phenomena which makes them more intelligent and makes life more interesting to them. The control of the sun over our temperatures, especially in the summer season; the relation of certain directions of the wind to certain kinds of weather conditions; the common increase of wind velocity towards noon in summer, with calms in the early morning and at night; the diurnal growth of clouds, with a maximum cloudiness in the early afternoon and a clear sky at night, a characteristic summer condition; the inversions of temperature on clear, calm winter nights and early mornings; these and many other facts will soon be learned by the scholars who take careful observations and who follow the records made in the record book from day to day.

Such observations as those here suggested for schools can certainly be begun in the early years of the grammar school. After some preliminary training the scholars will be fully prepared to go on with the work on weather maps, outlined in the Report of the

Committee of Ten on Secondary School Studies, and also to appreciate, far more than they otherwise would, such study of climates as their later studies in geography will involve. It is not likely that any regular text-book work in meteorology will find a place in our schools for a good many years. When it does come, this instrumental work, being taken first, will prepare the scholars for it; as long as the text-book study is omitted they are more intelligent and better educated for having had this training, even though they may never pursue the subject further.

It has been possible to indicate only in very brief outline something of the way in which this work may be done. There can be no doubt that the time is ripe for the general introduction of such a subject into our schools, and it is to be hoped that much advance will be made in the next few years. If the study trains only in observation and recording it soon loses much value. The aim of the work should be to interpret the weather laws, and to give the basis of understanding that will make the daily changes seem related in a necessary order, as they are. Again, as in other work in science, causes and their effects, singly and in combination, must be made prominent.

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THE CAUSAL NOTION IN GEOGRAPHY.

A distinct superiority is observable in the recent text-books on geography over those which have been in use for many years. With the latter, location of places is the point of importance, as location of cities, capes, bays, gulfs, rivers, mountains, boundary lines, etc. Hence there is an abundance of map questions. Such knowledge is useful, for in our civilization one would be ashamed to be without it, and because each form discussed influences man in his relation to the earth. But, nevertheless, it is an extremely dead kind of knowledge. It acts as a check to thought rather than as a stimulus to it.

The new geographies, on the other hand, gave relatively less attention to location of places, and much more to vivid discriptions, for example, descriptions of manufacturing processes, of rivers, of cities, etc. Consequently they have fewer map questions and more abundant illustrations. This plan certainly results in greater interest and clearer knowledge. But notwithstanding this merit of the newer text-books on geography, it is still a subject poorly taught in the common schools, because the causal notion is very largely omitted. The authors of these newer books seem to consider common school geography at its best as a descriptive study, and to separate it almost entirely from physiography and physical geography, just as literature is often separated from rhetoric. But the causal notion in geography offers the explanation for the facts ordinarily to be learned; it is the basis for a thoughtful study of the subject; and when geography is deprived of this basis it is necessarily uninspiring, just as rhetoric when isolated from literature becomes drudgery,

So long as the common school geography is mainly descriptive its highest aim is not to stimulate mental life, but merely to acquire useful knowledge. Hence, because the causal notion is little emphasized in the later books, they are little superior to the older books in regard to their chief purpose, but their method of attaining this purpose is better.

The time is certainly rapidly approaching when geography will accept as its highest aim the stimulation of thought, and when that time comes the causal notion, instead of being utterly neglected or given a very subordinate rôle, will play the leading part. causal notion were made prominent, as it should be, most of the facts that we ordinarily learn in regard to location would follow as a result in a causal series. Let an example illustrate this statement and the views thus far expressed. The old geographies located the important cities and rivers in Spain, making a few statements about each. The newer ones attempt a somewhat vivid description of the great plateau and of the coast country surrounding it; but there is one great fact often omitted that largely determines all the others which the common school pupil is ordinarily expected to learn. Suppose it is made clear that Spain is low around the coast, but that a plateau, on the average, perhaps, half a mile high, rises not many miles from the coast on the four sides of the Spanish peninsula, making almost all of the interior a tableland. This matter should be clearly understood. When that is accomplished, a key is given to many things that follow. The moisture in the winds from the ocean will fall upon the edge of the plateau in the form of rain. Hence the plateau itself will receive little moisture. That being the case, the rivers will be small on the plateau; there will be little grass, few woods, little vegetation in general, few animals, sparse population, and hence few cities. The small population will be further induced by the fact that the rivers on account of rapids and falls at the edge of the plateau will not be navigable. There is one great break in the plateau, namely the valley of the Guadalquiver, in which are the flourishing cities Cordova and Seville. Granada is among the mountains, but its site is chosen as a fortification. The water falling upon the edge of the plateau makes the coast the most fertile portion of the country. It also makes irrigation feasible, thereby increasing the fertility. Therefore, various important cities have sprung up along the coast. Of course, the fact that there are good harbors here and there locates several of those cities exactly. The teacher, by seizing this most influential fact of the elevation of the interior into a vast tableland, can bring most of the other facts into a closely connected series instead of teaching them as isolated facts.

A similar arrangement of subject-matter can be accomplished in teaching England. Ordinarily at least a dozen different cities and several rivers are to be located in that country. It is stated that a great deal of commerce is carried on, that England is a leading manufacturing country; exports and imports are also mentioned, etc. But the one fact that is the explanation of nearly all the others that need be taught is the presence of vast beds of coal and iron in England. If these two products are found there in great abundance it is likely to follow that a great deal of pig iron will be made, and of course all sorts of things which are manufactured from pig iron, as nails, screws, hatchets, axes, plows, rails, locomotives, all kinds of machinery, cutlery, iron ships, etc. order to make all these things, great numbers of people are required. Therefore, great cities have sprung up in the neighborhood of the coal and iron beds. Some of these cities are Manchester, Leeds, Sheffield, Birmingham, Nottingham and Glasgow. Those situated upon the coast, with good harbors, could, of course, become manufactories of ships, others of cutlery, needles, etc. In

consequence of these many manufactories, iron goods must be exported in abundance and, because the English build many ships, such exports would probably be carried in such ships. Those exports going to America would most likely leave by the western ports, and those going to Europe by eastern ports. Hence, we find Glasgow, Liverpool and Bristol, especially Liverpool, prominent ports for vessels to and from America. Partly in consequence of this business, too, these cities have become very large. Hull and London, on the east, have grown important in the same way. Since so many English people are engaged in manufacturing, they cannot find time for producing their own food. Hence, they will import food from our own country, such as corn, meat, etc.

Thus all these facts hinge upon the presence of coal and iron in England. Now, when it is also remembered that parts of England produce much hay (on account of the damp atmosphere and the rains), sheep raising becomes prominent and, since the coal for steam power is present, the conditions are favorable for the manufacture of woolen goods.

It requires time for the children to reason out and appreciate the consequences of one of these large truths, but when the causal notion is thus made prominent, and when the pupils themselves are allowed to discover the consequences through their own ability to reason, geography becomes a stimulus for thought, rather than merely a useful study. In the study of any country there are facts that have many consequences, so that the two examples above given are not exceptional. But even if it is impossible always to find such far-reaching causes, one of the safest thoughts for the teacher to impress upon her mind is that there are adequate causes for everything that has happened. These causes cannot always be discovered, but, inasmuch as we should deal only with very imporant matters in elementary geography teaching, very important causes can be found for them, and as a rule the teacher of geography can make the causal idea the most prominent thought in each recitation.

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GEOGRAPHIC AIDS. I.

In order to leave with the pupils a clear understanding of the fundamental and more important geographic features of a region, these features must be presented in many ways. In other words, illustration must be made by the use of special maps, pictures, models, selected passages for reading, etc., other than those of the text-book used by the class. Such extra illustrations are not used as much as they should be for several reasons; because many school boards and superintendents do not recognize the need of such materials in geography as are used in other subjects; and because teachers are often ignorant of the fact that much which is very good is at the same time inexpensive and often free. Some suggestions follow in regard to such illustrative material and how to secure it.

One of the most useful and cheap appliances for the graphic representation of geographic facts is a cloth blackboard, with the outline of the world or some selected area painted thereon in some conspicuous color. Such a board can be used to represent the distribution of any geographic feature, such as climatal regions, ocean currents, volcanoes, religions, races, etc., and always be ready for use by means of an eraser. Such boards can be procured for a small sum or can be made by the teacher on a strip of the special cloth made for the purpose. The J. L. Hammett Company, of 352 Washington Street, Boston, Mass., sell such a map, with an outline of any desired area, on 4-ft. cloth for \$4.50, with a discount. On such a map generalizations can be made that are not possible when only the isolated facts of the text-book are studied.

The features, worked out by the pupils under the guidance of the teacher, can be preserved for their further use on some of the cheap outline maps published by many houses, notice of one set of which is to be found among the reviews in this number of the JOURNAL.

A blackboard globe, of such a size as to be readily handled by the teacher is of great value, especially in the teaching of the ocean currents, winds, the revolution of the earth and kindred phenomena. I have found in my teaching that pupils are very apt to speak as if there was but a northern hemisphere, forgetful of the southern. Such a use of the globe does not allow pupils to generalize regarding the ocean currents and winds as if they were obedient to one set of laws in one hemisphere and another in the other hemisphere.

Maps of special features are often to be found in Government reports that can be procured upon application to the Chief of the Bureau publishing them or to the Congressman of the district in which the petitioner resides. Reports of several years ago are often exhausted, if of general interest, and in such a case can frequently be procured from the second-hand book stores in Washington.

In Report C, of the Weather Bureau of the United States Department of Agriculture, 1894, is a very valuable series of maps showing the weather conditions in the United States. It is of great help in studying the geography of the United States, especially in bringing out the effects of climate in determining the distribution of plants, animals and man. This map should be used in company with the Relief map of the United States, published in the 13th Annual Report of the Director of the United States Geological Survey, which can probably be procured from the members of Congress. This relief map has the heights of the land shown in shades of brown.

Among other Governmental reports that are extremely useful are the Pilot Charts of the Atlantic, back numbers of which are usually furnished upon application to the Chief Hydrographer of the Navy Department, Washington, D. C. In asking for a set, opposite months, such as January and July or February and August, should be chosen, thus securing a representation of the conditions on the ocean at opposite seasons of the year. These maps show the prevailing winds, the ocean currents, paths of storms, steamer tracks, paths of derelicts, fog areas, distribution of icebergs, and many other features. When mounted on cloth, as they easily may be by the teacher, they are capable of lasting a long time.

The daily weather maps of the Weather Bureau are furnished free to every school that will exhibit them promptly. Application for these should be made to the Local Forecast Official at the nearest station of the weather service. The climatic features of

the State of New York and their relation to man are well brought out in the Fifth Annual Report of the New York State Weather Bureau, which is usually furnished free upon application to the Director of the Bureau, Prof. A. E. Fuertes, of Ithaca, New York.

Local geographic features and typical earth forms, to be used as a basis of the understanding of remote forms, are well represented by what is known as contour lines on the Topographic Sheets of the U.S. Geological Survey. Applications, stating the names of the sheets desired should be made to the Director of the U. S. Geological Survey, Washington, D. C. They will be supplied when possible, and later may perhaps be procured for a small These maps represent equal heights by lines of brown, thus bringing out the shapes of the country. Drainage, towns, cities, roads, etc., are shown by appropriate symbols, and the maps are very valuable for many purposes. A description of a selected series of these maps is given in the pamphlet sold for thirty cents by Henry Holt, of New York City, under the title of The Use of Governmental Maps in Schools. This pamphlet contains directions for selecting and procuring all the best and available Governmental maps. In Massachusetts, Rhode Island, Connecticut and New Jersey, the State publishes maps of this kind. They can be procured for a small sum from the proper authorities.

Maps of small size, of great service for study by the individual pupils or for reproduction upon a blackboard map, are to be found in many text-books. Longmans' School Atlas (\$1.50) published by Longmans, Green & Co., in New York, and Mills, the Realm of Nature (\$1.50), published by Charles Scribner's Sons, are valuable sources of reference for maps of special features. Among the helpful maps in the former book may be mentioned those entitled Currents, Periodical Rains and Drainage, Isothermal Lines, or lines of equal temperature, Distribution of Atmospheric Pressure; Distribution of Vegetation; Density of Population. the second book the most helpful maps are those entitled Earthquake Regions and Volcanoes, Isobars and Winds for January, the same for July, Permanent Winds, Calms and Storms, Mean Annual Rainfall and Salinity of the Ocean, Configuration of the Globe (heights shown in shades of brown, depths in shades of blue); Drainage Areas of Continents and Co-tidal Lines, Ocean

Surface Isotherms, Coral Reefs, Rising and Sinking Coasts, Vegetation Zones; Faunal Realms. These last-mentioned books should be on the desk of every good school for reference.

At a later date, these suggestions, which it is hoped may be of some help, will be followed by others giving sources of collateral reading for special topics of interest and value.

RICHARD E. DODGE.

NOTES.

Yakutsk, Siberia.—In a review of a book on The Yakouti in Nature, December 3, 1896, is an interesting account of the climate in northeast Siberia, from which the following abstracts are made:

"As may readily be believed, the climate in these high latitudes is extremely cold, and the number of days that at Yakutsk are free from frost during the year do not exceed ninety-nine, yet during this brief period cereals grow and ripen, giving favorable returns; Kuban, a hard wheat, ripening in eighty days; other wheats in seventy-seven days; rye, barley and oats in seventy-one days. Of these they cultivate sufficient for their requirements and to interchange for manufactured products.

"Commencing towards the middle of September, frost continues to the middle of May, and before October 15th the whole region is covered with a solid mantle of snow and ice, which never melts until, under the influence of southwest and westerly winds, the thaw sets in at the end of April. The temperature throughout the winter varies but little, being from -48° Celsius to -67°; and it is remarkable that the cold is more intense in the southern than in the northern zone. The climate is exceedingly dry and exhilarating; day and night temperatures are identical, and there is not sufficient wind to winnow corn or move a branch. out these months Nature is in her deepest sleep. The sole evidence of faunal life is that of an occasional fox or hare; but no birds wing their flight, and desolation reigns supreme. Indeed, nowhere else in the world does winter reign under such calm, undisturbed conditions. With the approach of spring the weather becomes disturbed, and under the influence of the south-southwest and westerly winds, as if under the power of a magician's wand,

summer bursts upon the land. In the figurative language of the natives, 'Winter is a white ox with two horns, one of which is broken on the first Athanasius (March 5), and the second on the second Athanasius (April 24), and on the third Athanasius (May 14) the whole body disappears.'

"The summers are very hot, so that the variations are extreme-At Yakutsk the mean winter temperature is -45.5°, the summer + 22.4°; at Verchoiansk-58° and +28.2°.

"The country is well wooded, forests of pine, fir and birch extending for hundreds of miles along the rivers and the tundras of the north. They occupy about 70 per cent. of the land surface, but towards the north the trees become stunted, and deformed, few of them attaining a height of over 30 feet, or a diameter of 6-8 inches. So useless is the timber that the few natives resident there are forced to import wood from the south for their structural requirements."

R. E. D.

Central Asia.—Sven Hedin, an explorer at present in Central Asia, sends reports of his travels to the London Geographical Journal and to Petermann's Mitteilungen, from which the following notes are taken. The basin of the desert of Gobi is strewn over with the waste (or weathered rock) from the surrounding mountains, coarser and steeper sloping near the margin, finer and dead level in the center: there the altitude is about 800 meters. Many rivers from the mountains wither away in the desert sands, but the Yarkand, the largest of them, coming from the west, does not entirely disappear. It feeds Lop (lake) Nor in the central plain. In late summer the river is in flood and carries much silt, and this tends to drive the lake to the southeast. the summer wind, generally from the northeast, and often stormy, drifts the surface sands and raises so much dust as to darken the sky, hence called the Karaburan, or black storm; and this tends to drive the lake to the southwest. The expected resultant of river and wind action would be a southward migration of the lake, which Hedin believes to be confirmed by comparison of old and modern records.

Settlements occur only on streams, generally near the margin of the depression. Between the rivers there are vast areas of wandering sand dunes, absolutely barren. Across these Hedin re-

cently attempted a journey and barely escaped with his life, after great suffering.

The wretchedness and barrenness of this great basin serve to illustrate the misfortunes that attend an over-large continent, whose central area, being rimmed by lofty mountains and remote from the oceans, is condemned to be a desert.

W. M. D.

The Kura and Arás.—The following note regarding these two rivers in the Caucasus, taken from a review in the December number of the Scottish Geographical Magazine, is an interesting contribution to our knowledge of river changes:

"Professor Gustave Gilson, of Louvian, writes to the Mouvement Geographique, October 18th, on a remarkable change which has recently taken place in the relation of these rivers. The Kura, in its lower course, enters a broad valley which gradually expands into a plain, the southern part of which bears the name of Mughan. On this plain the Kura was, until lately, joined by the Aras (Araxes), but, since the inundations of last spring, the Aras has made its way through the marshes and lagoons of the Mughan directly into the Caspian, and now falls into Kyzyl-agach bay. The soil of the Mughan is formed by rich alluvium carried down by the two rivers, and the Russian Government has long desired to bring Floods in some parts and great drought in it under cultivation. others were the difficulties to be overcome, and to drain, and at the same time irrigate, this tract a canal was projected from the Aras to the Caspian. This canal has been formed by the river itself, and only a few simple engineering works are needed to render it permanent."

This seems to illustrate the well-known fact that tributary streams flowing toward a main stream in an alluvial valley often cannot flow directly into that main stream. The reason for this is that alluvial plains slope from the main stream toward the valley sides. It is thus more easy for the tributary stream to flow for a time along the side depression parallel to the main stream, and later to flow into the main stream, as does the Yazoo into the Mississippi, or to flow independently into the sea, as does the Aras at present.

Two independent rivers in an alluvial plain usually have some such a relation as is here described. The backward slope of the

alluvial plain away from the banks of the main stream, and the consequent drainage that seems abnormal at first, is well illustrated on the Gibson topographic sheet of Louisiana, published by the United States Geological Survey.

R. E. D.

Victoria, Australasia.—"During the last three years the city of Melbourne has lost 40,000 of its population, the prosperity of the agricultural industry of the colony affording superior attractions to the pursuits of the capital city.

"The colony of Victoria has shown remarkable energy in opening up an extensive export trade with Great Britain. The colonial government has practically assumed control of the trade, and its contracts with two of the principal lines of steamers enable shipments to be made at extraordinarily low rates, the charge for butter, cheese, and meat being only 1½ cents per pound for the voyage from Melbourne to London in cold storage. The butter shipments to London from this single colony last year were close on to 26,000,000 pounds, valued at \$5,406,215." National Geographic Magazine, December, 1896.

The Rapids of the Yang-tse-Kiang.—Between the towns of Kwei-chow and Ichang, the Yang-tse-Kiang passes by a narrow canon through a mountainous country. As a result the river is very tumultuous in its course and navigation is carried on with difficulty. The practical limit to navigation for steamers is Ichang, about 1,750 Km. from the sea. Between Ichang and Patung are seven series of rapids of considerable intensity, some of which are dangerous at low water. As there is no practical way of building canals around the rapids, the obstructions seem destined to be long a hindrance to opening up to commerce the vast country about the headwaters of this river.

R. E. D.

Geographical Boundaries.—There is a tendency among many geographers and teachers of geography to talk as if all was settled in geography. That in many cases the foundations, as it were, are not yet settled is shown by the following suggestive note from the New York Sun of a recent date: What is Australasia?

A learned society is rather unfortunate, to say the least, when it is unable to tell what its name means. This is the dilemma of the Royal Geographical Society of Australasia. It asked the

International Geographical Congress in London last year to give an answer to the question: What is the true definition of the term Australasia? The Congress, being very busy with other matters, had no time for this conundrum, and the question is still unanswered.

The Australian geographers decline to accept the British definition of the word, as given in the imperial statute, which declares that "the term Australasia shall signify and include New Zealand and Tasmania as well as Australia." Why, ask the Australian geographers, should New Guinea, Fiji, New Caledonia and the other islands of the South Seas be excluded? In fact, no geographical societies, and few writers, accept the British definition; but confusion arises because everybody uses the word according to his own idea of what it embraces. The Australians themselves have tried in vain to reach a common understanding. A geographical conference at Melbourne in 1884 argued the question, but failed to attain any conclusion, and none has been arrived at since, though the great society, with its branches in all the leading colonies, said in its memorial to the London Congress that "we consider it a matter of daily increasing importance."

The fact is there are few accepted boundaries for parts of the world considered in a geographical instead of a political sense. What is the geographical, the so-called natural, division between Europe and Asia in the southeast? One famous authority says it is the Manytsch depression north of the Caucasus; another that it is the line following the crest of the main Caucasus range, and still another that it is the southern boundary of Trans-Caucasia; and the latest edition of "Bevölkerung der Erde," which deals with the matter, gives three determinations of the total area of Europe, according as one or other of these boundary lines is accepted.

There is no agreement even as to the number of continents, for some distinguished writers recognize only three, Euro-Asia, Africa and America; and when they talk of the great divisions of the land surface, the number varies from five to eight according to different writers. Perhaps in only one respect is this a matter of much importance. When a writer or speaker refers to a region it is highly desirable to know how much of the earth's surface he includes under the name.

Until a half century ago there was much confusion in books and atlases with regard to the names and extent of the various oceans. The Royal Geographical Society of London appointed a committee in 1845 to settle these matters, and the conclusions reached by the committee, with some modifications, were generally accepted and have proved advantageous.

C. C. A.

Tides in the Bay of Fundy.—Baya Fonda, so named by the Portuguese navigators early, because it reached far into the land and now Anglicized as the Bay of Fundy, has a world-wide reputation for its excessive tides which, by tradition, reach seventy feet of rise and fall and advance with the speed of a galloping horse, as many of us have learned. The facts as stated in the Report of the Geological Survey of Canada, Report M, for 1894 are somewhat more sober, but extraordinary enough. On the coasts adjacent to the mouth of the bay, the spring (or full and new moon) tides vary from twelve to eighteen feet. Within the bay the spring and neap (quarter moon) tides are as follows: Digby neck, 22, 18; St. John, 27, 23; Petitcodiac river, 46, 36; Cumberland basin, 44, 35; Noal river in Cobequid bay, 53, 31; the last named being the greatest tidal oscillation in any part of the bay. At the bay head the flood tide rises about twenty feet above mean sea level; the ebb falls the same amount below, leaving the bottom of the branching bays exposed as extensive mud flats, through which little rivers flow from the land. The tidal bore (the advancing wall of water at beginning of flood tide) is best seen on the Petitcodiac river at Moncton, twenty miles from the bay head; it rushes in "as a foaming breaker, five or six feet high, with a velocity of five or six miles an hour." The ebb tide runs like a mill race, and when the muddy channel is laid bare the river is reduced to a small meandering stream. It remains so about two hours, when the rushing waters of the bore are again heard and the river is soon filled with the sweeping flood.

Tides of so great strength as these have the single advantage of carrying navigable waters at flood further into the estuaries than where the range is less; but they have the disadvantages of being accompanied by troublesome or unmanageable currents and of narrowly limiting the hours when landing can be made. Wharves to be used at all stages of the tide must be long and high and of expensive construction.

In this connection it may be noted that in describing spring and neap tides the adjectives, "strong" and "weak," are better than "high" and "low;" for spring tides are extra low as well as extra high, and neap tides are of faint depth as well as of faint height.

W. M. D.

Peary Land.—The northern part of Greenland, studied in 1892 by Lieutenant R. E. Peary, has been named Peary Land at the suggestion of the Geographical Club of Philadelphia, seconded by many other geographers.

R. E. D.

Trinidad.—Great Britian has given up her claim to Trinidad, which she tried to hold as a cable station, and has acknowledged the sovereignty of Brazil over this small but important island.

R. E. D.

REVIEWS.

New Century Development Maps.—The Morse Company, 96 Fifth Ave., New York.

The series of outline maps published by the Morse Company are a very valuable addition to the mechanical outfit for teaching the geographical distribution of peoples, climate, physical features, products, etc. The maps are printed on good paper of a size to be readily inserted in note books, and are put up in blocks of fifty, each selling at thirty cents a block. They are cheap, clear and convenient, and are far better than any other outline maps, raised or plain, thus far examined.

R. E. D.

A Course of Study in Geography, with Suggestions on its Applications. By JAMES A. MERRILL. Price 15 cents.

Professor Merrill, professor in the Normal School at Warrensburg, Mo., has prepared a course of study in geography that he has rightly called suggestive. The course is designed for teachers in Missouri and its application is made more directly to that State. It is, however, worthy the attention of thoughtful teachers in all States.

The aim of the course is to make the children more intelligently

and sympathetically interested in the geographic features of their State and the world. The course is inductive and leads up in the early years to a knowledge of the geographical principles that are helpful in later years. The course offers many suggestions as to a rational combination of geography with what is commonly called Nature Study.

The special features of the pamphlet are that it brings out the importance of out-of-door observation, and shows how accurate local maps can be made that will be very helpful in making clear the understanding of larger and more general maps.

The reviewer feels that much that is suggested for the third and fifth grades, in the way of field work, could well be presented to much younger pupils; in fact, has tried such presentation with profit to pupils and teacher.

This course is preliminary, as it pretends to be. It is, however, on the right road to making geography taught scientifically and broadly, and is far superior to most of the plans of a similar sort previously seen.

R. E. D.

The History of Mankind. By FRIEDRICH RATZEL. Translated from the second German edition by A. J. BUTLER, with introduction by E. B. TYLER. Vol. I. New York, The Macmillan Co. 1896. pp. 486.

The translation of the title of this book is unfortunate, but the translation of the book as a whole is admirably done. The German word Völkerkunde is different to translate, and the best attempt is by the translator of Peschel's Völkerkunde, "the Races of Man and their Geographic Distribution." The History of Mankind is scarcely suggestive of a work on geography; and yet the present work is not only one of the best studies of the culture side of human life, but is written by one of the most eminent professors of geography of our own time—Professor Friedrich Ratzel, of the University of Leipzig.

The first German edition appeared 1885-88 in three volumes, and it at once took high rank among scholars as a work of great merit. Subsequent travels on the part of Professor Ratzel, and the publication of much related material, made the revision of the work necessary. This was completed two years ago, and the Eng-

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lish translation is from the revised edition which condensed the work to two volumes.

No better introduction to the geographic study of man has been written than the first one hundred and forty pages of this work; and, leaving out of consideration the scientific value of the exhaustive treatment of the races of Oceanica, the Australians, the Malays and Malagasies, which is part second of the present volume, the discussion of the principles of ethnography in the first part gives the work such great pedagogic value as to make it an , indispensable reference book to all teachers of geography.

The situation, aspect and numbers of the human race; positions of the natural races of mankind; the nature, rise and spread of civilization; religion, language, science and art; invention and discovery; agriculture and cattle-breeding; clothing and ornament; habitations, the family, social customs and the state—these are some of the problems that Professor Ratzel asks ethnography to solve, and this in no superficial way, but—to use his own language—"to trace actually among these lower strata the processes which have rendered possible the transitions to the higher developments of to-day." He likens progress—growth in intelligence and culture—to the upward shoot of a plant. However high it may mount, its stem ever continues bound to the earth. Human nature must ever continue to center strongly about a geographic point of view; for, however much it may be modified, the feet continue to rest on the ground.

Professor Ratzel's interest in primitive people leads him to devote one volume of his work to the American-Pacific group of races, and these he has treated with a thoroughness and clearness that gives his book very great value. With each race, the physical and mental characteristics are fully discussed; and the numerous illustrations (1,160 in all) which accompany the text, add greatly to its value. No such number of excellent cuts, made from the drawings and the photographs of travellers and from the collections of the leading geographic museums, is to be found in any other work; and it is to be regretted that the colored plates are not of equal merit. No fault is to be found with the drawings of the plates, but the coloring is decidedly poor. Representations in black and white would have been preferable.

With the emphasis now placed on geographic instruction in English speaking countries, the publication of Professor Ratzel's book must do great good. It is sufficiently popular in style to come within the range of most teachers and sufficiently scientific in its methods to lead to a rational approach to the human side of geography.

W. S. M.

Map Modeling in Geography and History. By Albert E. Maltby, A.M., C.E. E. L. Kellogg & Co., New York and Chicago. pp. 223.

Dr. Maltby, in the book mentioned above, gives a very complete series of lessons on the use of sand, clay, putty, paper pulp, plaster of Paris and other materials in modeling. To one unaccustomed to the technique of handling these materials with success the book is of great value. We cannot agree with the author that the criticism against crude relief maps—that the vertical exaggeration is untrue to nature—is of equal importance in condemning the use of engineers' profiles. In one case the user knows his profile is untrue and in the other he does not, and hence the understanding of the one person and the frequent befogged condition of the other.

For elementary classes up to the third grade we believe that modeling work is helpful in small quantities, but we doubt the value of rough raised maps in higher grades, when good physical maps are procurable. The book contains many rational suggestions for bringing out the love of nature in a child and is to be commended therefore. The order of lessons might be improved, but a thoughtful teacher can arrange the work to suit his taste.

The suggestions regarding chalk sketching are very helpful and emphasize particularly well this mode of rough, but truthful, representation of geographic conditions. The book is a valuable and helpful compendium of modeling for those many teachers who approve of clay modeling, and contains many suggestions for primary work in advance of much that is now being done. The generalizations are not carried far enough in many cases, especially in regard to the comparative study of continents, but they are a step in the right direction.

R. E. D.



THE

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LAKES: A STUDY FOR TEACHERS.

Suitable method depends much upon the location of the school, but if good teaching is expected, geographic study must be strengthened by field illustration. In the study of lakes, to find a lake and master it is of the first importance. This the teacher in the northeastern United States can usually do. Often the lake will be accessible to pupil as well as teacher, for size is not the chief consideration. A pond across which a stone can be thrown will do good service. If even this is too remote for class excursions the millpond is the best substitute, and as a last resort, the wayside pool is not to be despised.

Teachers untrained in the earth sciences are often puzzled to know how to begin out-of-door study, what facts to seek, how to see them, what questions to ask of nature, how to record and classify them; these at first are troublesome matters. Given some sort of a lake, let us see what queries can be raised about it. They are not few. Where is the lake? What are the well known geographic features, natural or political, in reference to which it can be located? Does it appear in maps of the region? What is the character of the surrounding topography? Is the lake among high hills, or does it lie in a gentle depression of the

66 LAKES.

lowland? What is the nature and attitude of the rocks exposed on its border, or in its vicinity? Dimensions may next claim attention, length, breadth, area, with soundings for greatest depth and topography of bottom. If the teacher is fortunately placed upon the border of one of the Great Lakes the appropriate sheets of the United States Lake Survey should be purchased; if on the borders of some of the Finger Lakes, maps with soundings can be secured from the Engineering department of Cornell University; if in some other parts of New York, in southern New England or New Jersey, the topographic atlas sheets are available. The lake may be one of the numberless examples which are reputed bottomless. Let the teacher make accurate soundings, or, if a lady, assign the inquiry to a couple of careful and mature youths. The result will create interest outside of the school room.

The water supply might next be studied. If by streams what is their character and the extent of their drainage basins? If their fall is slight, or if they drain woodlands, little but fine material may be brought in. If the surrounding country is rough and under the plough, much sediment will be brought to rest in the lake. If there are no streams, then rains, melting snows and springs are the sole sources. The extent of such supply must be gauged mainly by the outflow. This leads to the possible methods of withdrawal of lake waters, viz., by evaporation, by surface streams and by subterranean flow. The variable ratio between supply and withdrawal, determines seasonal and minor fluctuations in the lake level. For a somewhat experienced teacher and the maturer pupils, it would be a neat problem to determine the amount of supply by springs, by gauging surface inflow and outflow and taking account of evaporation, and seeking the annual mean in all cases.

Wave movements may next be taken up. Inquiry will be made as to prevailing winds, their strength and direction, with relative rates of destructive action on opposite sides of the lake. This inquiry can best be made if the lake is one of considerable size. The study of beaches will follow. The slope of the marginal bottoms is here an important factor. If very gentle and the lake of some size, an off-shore beach may be formed. If the slope is considerable, but not too great, the waves will act effectively as a

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horizontal saw cutting away the shore, thus making a shelf backed by a cliff. The material may be deposited at adjacent or remote points along the shore. Thus we have "wave-cut" or "wave-built" beaches. If the waves attack a mass of incoherent material the shore cliff will be sloping. If they attack rock, the cliff may be vertical or even overhang. The nature and structure of shore materials will produce an indefinite variety of results which must be studied for each case. Even if we have but a small pond, beach work may often be instructively studied at low water stages, when a succession of minute parallel beaches will often appear through a vertical range of one or several feet. Besides the beaches, bars, spits and deltas are to be sought.

Other deposits are made upon lake borders and bottoms. have not yet taken account of the finer sediment which is afforded by the inflow of streams and the beach mill, and which is spread as a mantle of mud over the entire floor. The teacher might devise means for dredging material from depths of ten or twenty feet for comparison with the coarse material of the shore. Where the marginal waters are shallow, marsh vegetation with entrapped sediment can be found. The settling of such organic material into the preserving moisture produces constant accumulations, and the zone of water lilies and flags can often be crossed to the region of low lying, but solid and rich meadow land, while back of the meadow plain the more ancient shore rises as if from the water. All this can be appreciated by very young pupils. The deposition of animal remains in the lake bottom can often be made out. Especially is this true in many glacial ponds, without inlet, hence without mechanical sediment and inhabited by uncounted millions of small creatures which secrete frail shells of lime whose decay fills the bottom with a white, oozy mass of shell marl.

The winter ice may be studied. Its varying thickness in different years, or at different points, would be matters of interest. The latter phase of the inquiry might lead to the location of important feeding springs. Whether the cracking and refreezing with water in the crevices induces a shoreward thrust and carriage of material, may be observed. The temperature of the water and the effects of the presence of the lake on climate are facts of importance, especially if the lake be large. In such cases the leading

industries of the region may hinge upon the climatic effects, as witness the orchards and vineyards of western New York.

Reference has already been made to lacustrine organisms from the point of view of deposition. They may also be taken up for their own sake. The lake border vegetation should be compared with that of the surrounding uplands. A class of boys would not fail of response to a call for the study of the fish fauna. With such help an all but exhaustive list could be made, instructive comparisons could be drawn between animals of the lake and adjacent streams, or of the seashore, if the location were so fortunate.

The human interests that gather about lakes are many. Their fish may be a food supply of some value. As water supply for towns they have rapidly growing worth, as seen in the persistent and vastly expensive efforts by the city of Syracuse, to utilize the As reservoirs for water power, waters of Skaneateles lake. canal supply and the cutting of ice, only mention need be made. The æsthetic and sanitary value of lakes can hardly be overstated, as for boating, skating, camping and summer study. Like other elements of our natural scenery, lakes have won a goodly place in our literature, and it is not too far afield to suggest the class use of such a poem as Whittier's "Summer by the Lakeside," or such a prose piece as "Lake George" in Curtis' Lotus Eating. The navigation of our great lakes offers one of the most striking themes in commercial geography. The teacher should read Professor Russell's summary* of which a sample fact is the excess of Sault St. Marie tonnage for 1889 over that of the Suez Canal, or "the fact that the amount of goods carried each year on these inland waters, is far in excess of the entire clearance of all the seaports of the United States, and several millions tons in excess of the combined foreign and coastwise trade of London and Liverpool."

What is the origin and history of lakes? This is the most significant question which our theme offers to the geographer. Logically it comes first, but here put later, in the belief that in ordinary school work such studies as have been outlined may best lead up to the more difficult inquiry. Some maturity is here need-

^{*}Lakes of North America, pp. 61-62. Every teacher of geography should possess this instructive little book.

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ful and some knowledge of geology as well, hence much more is practicable in the high school than in the grades. Some simpler cases of genesis can, however, be made clear to young pupils. Thus, whether glacial action be fully understood by the pupil or not, it could be made plain to him that a part of an old valley has been blockaded, if it were a case of the morainic dam. If the leading facts about glaciation are familiar, it might be possible to explain the kettle hole and the rock basin, although in the latter case the teacher should be reasonably sure of his facts. Solution or river lagoon lakes could be set forth in a somewhat simple manner, and, perhaps, the crater lakes, especially if the teacher have at hand the Ashland sheet of the Oregon map, and have taught the pupil how to read such maps.

The limits of this article forbid extension here, and, indeed, it is intended more as a suggestive guide than as a presentation of a body of facts. The teacher should study Chapter I. of Russell's "Lakes of North America" and Davis' paper on the "Classification of Lake Basins." The principal kinds of basins described by Russell are as follows:

Depressions on new land areas.

Basins due to atmospheric agencies.

Unequal decay of surfaces, erosion by winds, depressions among dunes.

Basins due to aqueous agencies.

- (a) By streams—excavated at base of water-fall—main valley, silted by tributary—alluvial cone dam—oxbows—delta areas surrounded by areas of greater deposition.
- (b) By waves and currents—borders of water bodies isolated by bars.

Basins due to glacial agencies.

Ice dams, rock basins, moraine blockade, kettle holes, other inequalities in the drift.

Basins due to volcanic agencies.

Lava blockade, craters.

Basins due to earthquakes.

Basins due to organic agencies.

Coral lagoons, enclosures by peat, beaver dams, fallen and floating timber.

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Basins due to landslides.

Basins due to chemical action.

Basins due to movements of the earth's crust.

It should be remembered that some of these causes are trivial as compared with others. Taking the world over, the glacial lakes probably outnumber all others put together. Thousands of glacial lakes and ponds exist in the small state of Massachusetts; 360 such water bodies are said to be present in the town of Plymouth. The student should compare maps of New York and Minnesota with those of Kentucky, Tennessee or Georgia, to see the contrast in the distribution of lakes, between a glaciated and an unglaciated region.

The history of a lake should then be traced in general outline. Water is held in an inclosed depression of the land surface, usually at some distance above the sea level. To the geologist, lakes are ephemeral. But the teacher must make this conception real to himself before he attempts to impart it. A lake may be obliterated (1) by filling it up, (2) by tilting its basin, (3) by the downcutting of its outlet, or (4) by drying away. (2) would not be ordinarily recognizable. For (4) a long cycle of change of climate would be necessary, (3) applies to every lake which has a surface stream as an outlet. (1) applies to all lakes. (1) and (3) therefore, concern every student of lakes. Any alert teacher can find all steps of lake filling, at least in a glaciated region of diversified topography. The bottom muds, offshore beaches, bars, spits, deltas, encroachments by water-loving vegetation; all are to be taken into account. Some lakes have lost a fourth of their area. some one-half, some are all gone but a pool, others once existed where now is meadow. The cutting down by the outlet must not be forgotten. See whether it passes through a gorge of its own making. Note whether it has large fall; if so, backward erosion will eventually tap the lake and the old lake bottom muds will be turned into terraces on the banks of the stream, and the muds of these terraces, having paused for a time, will gradually move on and finish their journey to the sea. The pupil should be familiarized with these considerations little by little and by all available illustrations. Not seldom a mill pond is drawn down, revealing its slimy floor covering of the muds which have gathered during

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ten, twenty or forty years. The teacher should not neglect so good an opportunity. Small lakes already, or almost filled will convince that larger ones must meet the same fate, and the time comprehension be gradually extended. Recent comparisons of a map of a district of Switzerland made in 1667, with a modern map, shows that 73 out of 149 lakes have disappeared within this period. That in many cases the disappearance is due to drainage for agriculture, does not destroy the value of the illustration.

A great principle in this, as in all other geographic study, is the principle of comparison. Having mastered his one lake, let the teacher compare this with all available cases, all that can be visited or remembered, or found in published description, or delineated upon maps. Herein is the highest educational value of such study.

We are now ready to suggest the yet broader relation of lakes to the development of land surfaces. They are signs of geographic youth. The tendency of every land surface, with its unceasing decay and its network of streams, is toward simplicity of outline, and perfect drainage. When perfect drainage has been attained there can be no lakes. A surface is then "mature" or is passing on into old age. It is moving through a great cycle of denudation which, if not interrupted, will find its goal in a flat plain worn down close to the level of the sea. In various ways such a cycle may be interrupted. Thus, before the ice time, central and western New York had a mature topography. Neither hilltop nor valley bottom predominated. There were vast areas of perfectly drained slope. Now there are hundreds of lakes. We have gone back to immaturity and are traversing what may be called a new cycle. Perhaps no large area is ever without some lakes. There is uplift as well as down wear, and if the major causes of basins are absent, the minor causes, as earthquakes, solution or the winds, may be at work.

A final word may be said on the relation of lakes to rivers. A lake may be the source of a river, the lake being fed by springs, that is, by underground streams. Or a lake may be terminal to a river. Such are the salt lakes, where evaporation keeps pace with supply and prevents overflow. Thus Great Salt Lake is terminal to the Bear, Weber and Sevier rivers, and the Dead Sea to the

Jordan. Or a lake may both receive and discharge a surface Here inlet and outlet are to be regarded as one stream. The lake is only an expansion of the stream due to some cause which works inequality in its path towards the sea. river will efface the inequality as soon as possible. Instead of a series of levels interrupted by falls, rapids, or appreciable slopes, it will have a lowlying, unified and nearly horizontal ultimate course to the ocean. Meantime it will drop portions of its load in the lakes and bend its energies to cutting away the interrupting But all material within the river's grasp knows but one To see this goal and the great network of changes by which it is attained, and the panorama of land surfaces which pass under the geographer's mental eye as if he lived throughout the long cycle, should be the aim of the teacher; and, having seen, to pass the vision on is his highest delight. A single lake thus broadly studied will give the earnest inquirer a comfortable introduction to the large realm of the new geography.

ALBERT PERRY BRIGHAM.

COLGATE UNIVERSITY.

THE GEOGRAPHIC FEATURES OF THE CONNECTI-CUT VALLEY IN WESTERN MASSACHUSETTS.

The early colonists of Massachusetts Bay had but just established their new homes, on this side of the Atlantic, when their curiosity and ambition were aroused by reports of an attractive country and fertile soil in the valley of the great river called, after its Indian name, the Connecticut.

The description of the level, well watered, mellow meadow lands appealed strongly to a people of agricultural pursuits. The contrast with the hilly, stony, and but moderately fertile coast country increased the desire to go up and possess this new land of promise.

So in 1636, a band of emigrants from Massachusetts Bay journeyed to the valley of the Connecticut, and there, opposite the mouth of the Agawam River, founded the town of Springfield. The Indians were fully aware of the value of alluvial soil and the

price they fixed on the Agawam meadows was so high, that while the settlers secured certain holdings in the meadows, their homesteads were placed on the opposite side of the stream.

Springfield, thus founded, became a center for further colonization. Successive bands of settlers, moving northward, founded Northampton, in 1653; Hadley, in 1661; Hatfield, in 1670, and Deerfield, in 1672. Explorers of the Agawam River early established a hunting post in the beaver country, where Westfield now stands, and this post had grown into a permanent settlement by 1670. Only the time of one generation was required to occupy the broad, alluvial plains in the valley, while the neighboring highland, as yet remained untouched.

Climatic conditions, as well as fertility of soil, influenced the progress of colonization. An isothermal map shows that the lines curve far to the north in the lowlands, because the warm winds from the south raise the average temperature. In spring the lowlands are often ready for the plow, while snow banks still linger on the not distant hillsides.

When King Philip's War broke out in 1675, the towns in the Connecticut Valley constituted the western frontier of the Massachusetts colonies. This exposed position and the manifest desire of the Indians to regain control of their rich corn fields threatened the settlement, for a time, with utter destruction.

Its strength was centered at Hatfield, Hadley and Northampton. Deerfield, at the northern end of the line of towns, was especially open to attack.

While the most threatening danger passed with the collapse of King Philip's conspiracy, Indian forays did not cease until 1758. The deeply eroded valleys of the Westfield and Deerfield rivers, together with the passage north, opened by the main stream, were used as convenient routes by the various war parties. The hill country beyond was, however, an effective barrier against a regular army, so that during the entire struggle of the Revolutionary war, the valley saw nothing of the English soldier save as detachments of Burgoyne's surrendered army were marched eastward from Saratoga. Possibly this immunity from attack induced Congress to place in Springfield an armory and workshop for munitions of war. This establishment is now the most important government manufactory of small arms.

The struggle with the Indians held the settlers well within the limits of the valley and it was not until the early part of the eighteenth century that the hill country was opened. The inhabitants of the main valley made their way along the tributaries and selected sites, where small flood plains gave promise of good tillage. Bands of emigrants from the east moved across the country and, finding the valleys occupied, settled in the most desirable location on the upper plateau. The stone walls on the farms of the hill country tell their own story of the struggle of the settlers with adverse conditions of soil and tillage.

Of necessity the character of the farming on the upper plateau was much different from that of the lowland. The valley produced rich luxuriant crops of hay, corn, grain, vegetables; on the hills hardier crops flourished, while the farmer placed much dependence on pasturage and woodland.

As soon as the period of settlement under the agricultural impulse drew to its close, the people began to consider better means of communication with each other and the outside world. A thriving boating industry grew up on the great river and, to facilitate passage around the rapids, canals were constructed at Turner's Falls, at Holyoke and at Enfield, and an unobstructed water way was opened to the Sound.

Trade relations were thus established with the towns of Connecticut and New York. The demands of this traffic led certain capitalists to construct a canal from Northampton through Westfield to New Haven. The route, which the canal followed, was a narrow, longitudinal valley between the steep range of Mount Tom and the western hills. This ambitious enterprise was destined to financial failure, for railroads supplanted it before adequate returns were received on the investment. Boston, as yet, was only reached by a journey over the rough country roads. So strong did the demand for adequate facilities of communication with the east become, that, in 1826, a state commission seriously considered the construction of a canal through Worcester county along the valley of Miller's river, and thence up the Deerfield to Hoosac Mountain. This barrier was to be pierced with a tunnel four miles long. Had such an undertaking been carried out, it might have made Greenfield, rather than Springfield, the commercial and manufacturing center of the valley.

The natural obstacles were so great that the enterprise was dropped; railroads were projected and the opening of the line from Worcester to Springfield in 1839, and from Springfield to Albany in 1841, assured the supremacy of the pioneer town.

The route which the railroad followed was determined in the main by geographical conditions. The valley of the Chicopee river afforded an easy means of approach from the east, and the traveller can see for himself how closely the tracks follow the stream. On the Albany side of the Connecticut river the Westfield has cut a channel back to the divide between the basins of the Connecticut and of the Housatonic, and this the railroad utilizes.

The development of Springfield was thus fostered, and the many towns along the route have enjoyed a decided advantage over the more remote settlements. The transverse valley, formed by Miller's river and by the Deerfield river, in the northern part of the State, is now occupied by the Fitchburg Railroad. Many thriving towns, such as Fitchburg, Orange, Greenfield and Shelburne Falls, have prospered through this route. The third and latest railroad from east to west, begins at Northampton and makes its way across the meadows of Hadley, through Amherst, and thence by a devious route to Boston.

Two longitudinal valleys, besides that of the Connecticut, have been occupied by railways. One contains the important towns of Amherst, Palmer, Monson, and is the line of the New London Northern Railroad. West of the Connecticut river the New Haven and Northampton Railroad has taken the place of the canal, which bore the same name.

The railway system of the Connecticut valley then consists of three important routes from east to west, and a like number from north to south, and important towns are found at points where any two roads cross. The northward extension of the Connecticut River Railroad has made the valley the main route from New York to Canada, while Springfield is on the route from New York and from the west to Boston.

The third stage in the history of the valley was characterized by growth in manufacturing industries. Saw mills and grist mills were operated by the water power of the mountain brooks from very early times. It was, however, the combination of means of

transportation by rail with the utilization of water power that made possible the establishment of the great manufactories of which the valley is proud. The growth of Holyoke is a striking illustration of the value of a water privilege. Until 1840 or thereabouts, Holyoke was a small, insignificant settlement. The Connecticut river at Holyoke, however, makes a descent of 60 feet in one and a-half miles, and in 1849 a dam was built across this stream, which gave its projectors the command of 30,000 horse power. Holyoke has now become a city of over 40,000 population and possesses the most important manufactories of paper in the world. The power furnished by the dam at Turner's Falls also supports many thriving industries. Along the tributaries of the Connecticut are to be found Chicopee, with its workshops for the production of textile fabrics and metal goods. Falls on the Deerfield, Haydenville, Florence and Leeds on the Mill river at Northampton; these and many other towns owe their prosperity to the water privileges they possess. Various suits at law testify to the jealousy with which such advantages are guarded by their owners.

Mining has played but a small part in the development of the valley. Certain deposits of lead ore in Southampton were worked during the time of the Revolutionary War. At Granby, Connecticut, a little south of the Massachusetts line, there is at Newgate Prison, an old copper mine whence the ore was obtained and smelted by the convicts early in this century. The Davis mine at Rowe, in the hill country northwest of Northampton, now yields an abundant supply of iron pyrites. At Chester, twenty-six miles west of Springfield, in the valley of the Westfield river, there occurs a deposit of emery, the only instance of the kind in the United States. The mining and preparation of this material for market constitutes a thriving industry.

Valuable building stones are quarried in the red sandstone of the valley, and also in the older rocks of the hills. At East Long Meadow a number of outcrops of the sandstone have been worked for many years. This stone is extensively used for trimming in "brownstone front" houses, etc. At Monson there are found beds of a fine gneiss, called "granite," which is in great demand by builders.

The geological processes by which the valley of the Connecticut has been brought into its present condition are deserving of The highlands, on the east and west, are the remnants of a mountain system, the summits of which rose to many times the height of the peaks of the present day. The main valley was at one time a wide estuary in which were deposited the clays, sands and gravels which have hardened into the red sand-Through cracks and fissures in this sandstone lava outflows occurred. The processes of denudation had cut down the mountain system to a nearly dead uniform level, and then the entire country was raised and given a general slope towards the south. The rivers which had become sluggish through the gentle slope of their channel now renewed their activity. gan to cut new valleys in both the hard gneisses and schists and in the soft sandstone of the valley. The sandstone rapidly yielded and the processes of weathering, joined with the erosion of the Connecticut and its tributaries, worked out the present broad valley. The streams in the hills are still making their way through narrow deep gorges and ravines. The lava dikes in the sandstone resisted the water action, and now rise above the valley floor in the ridges of Mount Tom and Holyoke. Then followed the period of the great ice sheet which filled the valley and covered the hills, and, as it retreated, left behind the mass of debris, called drift, unassorted gravel, sand and boulders on which the rivers are still working in many places. After the ice a period of flood filled the lower valleys with deposits of clays and sands through which the rivers slowly cut their way down, leaving behind them the terraces which mark their descent to the present level. It is these terraces that add so much to the beauty of the situation of the cities and towns along the river.

The rich alluvium of the valley lowland is a source of prosperity to the farmer; the slope of the upland and the valley furnish the necessary conditions for the water power on which the manufacturer depends; the valleys formed by the erosion of the rivers and by the folding of the hills constitute the avenues along which trade and commerce move.

This limited area thus furnishes a good illustration of the influence of the earth's surface features and geological structure on

the progress of man. The centres of agriculture, mining, manufacturing and commerce have been determined by geographic controls, the influence of which was felt by the Indian and still more by the white settlers.

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RACE CRADLES.

When Stanley voyaged down the "unknown river" he found a dense population dwelling along its banks. For hundreds of miles he fought his way through lines of war canoes swarming with armed savages, and it was only when he neared the coast that the natives began to give way with the signs of European settlement between the great cataracts and the ocean. In savage, as in civilized countries, the densest population is along the rivers, for here more than anywhere is an abundant food supply, and here is the natural highway of peoples. Man has ever followed the line of least resistance, and the river valley has been a trodden road from the time when the earliest men began wandering up and down the earth.

It is indeed, of more than passing interest to note that the earliest traces of man—those rough stone implements with which he began to hew out his destiny—are found imbedded deep in the river gravels. The flood-plain of the river was the scene of the earliest civilizations, of which we have record, for here are the garden spots where agriculture was first developed, and from agriculture those other cultures, which form the material basis of an advancing social state.

While the river invited man, the mountain repelled him. Its gloomy forests and deep gorges, its beetling crags and precipices, its lofty peaks and ranges—the abode of eternal snow—filled the minds of the early people with a sense of terror. To the primitive nations, who dwelt in the shadow of the towering snowy range, the transalpine land was a terra incognita. The mountain stood there at once their rampart and their prison wall. When the early Aryans found their way over the Hindu Kush and peopled the fertile flood-plains of the Indus and the Ganges they were des-

tined to centuries of isolation, shut off from the rest of the continent by the giant wall of the Himalayas. China was in like manner sequestered in the valleys of the Yang-tse-kiang and Hoang-ho. Egypt and the Mesopotamian civilizations arose and flourished in their fertile flood-plains, guarded on all sides by the dreadful desert, equally as savage and inhuman as the mountain. Nature thus marked out for man his garden spots and held him there until he had reared his monuments and built his cities.

From a geographical point of view we may recognize four types of man: the fluviatile or the people of the river, the coastal and insular people, the tribes of the mountain and the tribes of The first of these, those dwelling along the great rivers, were the first to reach an advanced state of civilization as a result of their favorable environment. We have only to recall the Egyptian, the Mesopotamian, the Hindu and the Sinitic or Chinese. The people dwelling along the shores of the ancient lands naturally became voyagers and in time peopled the outlying islands and archipelagos. In their capacity to develop centers of civilized society, they were markedly inferior to the river peoples because their narrow coast strips, suffering from the denuding effects of the sea, the opposite of that invaluable process of building up by the deposit of alluvial mud over the flood-plain of the river, were comparatively infertile—shifting sands and bare rocks. Only on the larger island groups did a civilization like that of the Japanese, finally become established, and that by a race from the mainland in which were the germs of future possibilities. Malays and the Pacific Islanders in the tropics, and the Eskimos and Northern Asians are the typical insular and coastal peoples.

The mountain peoples are conspicuously in the minority; only two have ever been prominently before the world. The fastnesses of the Karakorum and Himalaya and the highland of Thibet have long sheltered a peculiar people who have reached a remarkable development in things occult. In the western world the Peruvian civilization and its neighbor, the Aztec, stand out as the only notable social development in the whole vast domain of America. Undoubtedly the mountains' influence in these cases was that of a guardian, isolating them from all the lower world of civilization and savagery. We have a more notable instance in modern his-

tory of the influence of the mountain in maintaining the integrity of a people that have always lived surrounded by more powerful nations. The Swiss, though a small polity among European powers, have preserved their national characteristics almost intact through many adverse conditions by virtue of their alpine home.

Lastly, the desert has developed the wanderer, the man of no settled purpose, who, as the Arab trader, has threaded its dreary waste with his caravans from time immemorial. In the dawn of history his people, ever on the move, became the link that brought civilization in contact with civilization. Under the influence of Mohammedanism he swept the eastern world from the Ganges to the Pillars of Hercules and from the Aude to the Zambezi, spreading the arts of the oriental world westward along both shores of the Mediterranean and carrying the creed of Islam into every region which he penetrated. It is a remarkable fact that the three great world religions, Christianity, Mohammedanism and Buddhism, have arisen under adverse geographical conditions; the two former born out of the desert, the latter nurtured in the mountain fastnesses of Central Asia.

The river peoples, those dwelling in the flood-plain region, have always been in the advance guard of civilization. The nations of Western Europe have developed on the waterways of the great central plain. The British Islands were conquered and settled by a race that came from the flood-plains of the rivers that flowed into the North and Baltic Seas. Rome arose and flourished on the Tiber under the guardian wall of the Alps. The Hellenic Mediterranean offered similar advantages to early civilization—its archipelagos forming a series of waterways between the islands that both protected its cities and formed an easy means of interchange. So with Venice on the islands in the delta of the Po. The shores of the Mediterranean Sea, as the theatre of those first great achievements of the race possess a marvelous interest to the student of anthropo-geography, for this great land-locked waterway nurtured and protected the early peoples whose art and genius civilized the world.

The extremes of climate have blighted many peoples; the tropical forest and the barren tundra are alike the discouragers of advancement. This together with the peculiarities of contour,

relief and drainage have profoundly affected the world's history. The three great races, the white, the yellow and the black, found their cradles and areas of characterization in the three great zones which they dominate to-day. The white peoples have always occupied a wedge-shaped territory with its broad end reaching from the North Cape to the northeastern border of the Sahara Desert, the northern and southern boundaries narrowing from thence to their point of convergence in the neighborhood of the Lying almost wholly within the temperate zone, with a wonderful diversity of surface, a vast coast line inclosing great inland seas, wide and fertile plains, broad rivers, mountain barriers, steppe and forest lands, this central domain of the white race is in striking contrast on the one hand with the bleak, inhospitable plateaus and the wilderness of forest and marsh that stretches north into the Arctic zone, comprised in the vast area of Siberia, Mongolia and Manchuria, the cradle of the yellow race; and, on the other hand, with the enervating forests of tropical Africa, the home and cradle of the black peoples.

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THE USE OF GEOGRAPHICAL PERIODICALS.

The journals of various Geographical Societies, which we recommend to the attention of school librarians, contain a great variety of essays that may be made to yield much information pertinent to the needs of the school teacher. For example, the Geographical Journal, the organ of the Royal Geographical Society of London, contains in its January issue A Journey through the Malay states of Trengganu and Kelantan" by Hugh Clifford, illustrated by a number of pictures from photographs, and accompanied by an outline map showing the traveler's route. Now at first sight, this would not appear to be a promising article for a school teacher to read. The region lies on the eastern slope of the Malay peninsula, between latitudes 4° and 6° north. It seems remote, and the essay appears to be much occupied with considerations of a more advanced nature than would be fitting in school work;

yet a further inspection reveals many items of immediate application in elementary teaching. They would be acceptable additions to the teacher's store of information if they could be remembered and used at the right time. But memory does not always suffice to preserve definite records; something in the way of permanent notes is needed. Moreover, it is important that the notes taken while reading should be in form for ready use when wanted, without re-copying. Hence I suggest a method of reading and recording that has been very useful in my own work. It is presented here in rough form, in order to persuade the busy teacher that no time need be given to elegance of finish; it is substance, not style that is aimed at.

In the first place let it be remembered that the object of reading is an enrichment of class-room work. The teacher should strive to be able to explain and illustrate every statement of the text-book; and to enlarge and comment upon all the more important passages by narrative and example. As the contents of the text-book are already in mind, let the reading of geographical books and essays be directed to the discovery of items and descriptions that can be related to the text in one way or another; at one time serving slightly to expand a brief statement; at another time, adding a whole new chapter of information. When such material is found, let it be entered in abstract either on blank interleaves of the text-book, or on note slips, such as may be torn from a block of paper of convenient and uniform size. If entered on blank interleaves, the items may be placed close to the paragraph with which they will be used. If entered on separate slips, some system of classified headings must be devised; and these had best be similar to the headings of chapters or divisions in the text. Systematic reading and abstracting is laborious work, but it is extremely profitable. If continued a few years, the teacher will be well repaid, as I know from my own experience, by the fund of valuable and pertinent information that is thus conveniently gathered.

Now returning to Clifford's journey, let us see what items may be gleaned from it. Here are some samples, sometimes abbreviated, sometimes deliberately quoted, and all in the rough order in which they were abstracted. A short reference comes at the end of each, showing its source.

Monsoons.—N. E. monsoon sweeps across China sea, Nov.— Feb., causes huge breakers on shore of Malay peninsula and "keeps beaches free from the dismal mangrove swamps which do so much to disfigure the scenery in the straits of Malacca." In N. lat. 4°-6°, beach of bright yellow sand, strewn with marvelous shells, interrupted only by occasional rocky headlands. During this season, navigation of coast exceedingly difficult. Entrance over bars at river mouths possible only at spring tides, and then dangerous if wind strong. From March to October, sea calm, offshore breeze in early morning, on-shore in afternoon. "Morning land wind takes out with it large fleets of native fishing-smacks with their broad palm leaf sails, which in the afternoon are wafted in again by the evening breeze." Fishermen work hard in this season; live rest of year on earnings, repair boats and houses, mend nets, do a little planting.—London Geogr. Journ., '97, 3, 4, 37. (Mem. Put ref. to this under Malay States.)

Malay States.—Inland from east coast, country covered by one enormous forest and tangled jungle. Gigantic trees, 80 feet before branching; among these, "lesser trees push and crush their way upwards, fighting among themselves for every square inch of available space." Like crowd at theatre exit. Brambles, thorns, creepers, and undergrowth twine beneath "in one huge intricate and entangled web." "The whole reeks with the damp smell of rotting and growing green stuff." "There reigns by day a perpetual gloom and silence." "Jungles are dark almost before the sun sinks." Thro forests, a few tracks, the merest foot-paths, run from point to point, kept open by traffic of successive generations of men. An occasional giant tree falls, bearing down adjoining growth, forming barrier 20 feet high; fresh track cut around it. Even the beasts of jungle usually come and go by well-worn paths. Rainfall and dew heavy. "The country consists of a number of small hills, and in the guts between each one of these there is a stream of more or less magnitude." (This seems to mean an upland well dissected by branching valleys.) Leeches are plenty in dank leaves underfoot. No lakes or ponds. Travelling is difficult on land: hence rivers are chief highways of Malays. Large boats in lower rivers, changed for smaller boats in upper branches. At night, animals of jungle are afoot, and their cries are heard.

Tracks of animals going down to water, often six feet wide, as well beaten as bridle paths. Lower Stiu river is infested by crocodiles, much dreaded by natives; may even attack and capsize boats. People mostly live along rivers. One district, near Besut river, devastated by typhoon in 1881; forest blown down, afterwards burned for several miles back from coast; only open place in the region. Much about corruption of officials, taxation, etc. London Geogr. Journ., '97, 15.—(Mem. Refer to this under forests and rainfall.)

Races: Malays.—Details of a barbarous prison; wretched fate of prisoners. Prison is in center of city; an enclosure of boards, ten feet high, surrounding space containing cages for prisoners. Cages with slats of heavy boards, stand in two rows, back to back. Each cage six feet long, two wide, five high; raised six inches above ground. Prisoners are literally never allowed to leave cages until sum of money is paid by family, or until dead. Men, women and children; in 1894, three men died of starvation. Officials and people indifferent to welfare of prisoners. All foul and filthy; no water for bathing. Some prisoners become "absolutely callous and indifferent, expressing no longer any desire to regain their liberty." Dreadful description of inhumanity in a barbarous people.—London Geogr., '97, 24-26.

It is manifest from the variety of facts in these extracts that a teacher's resources in the way of narrative description would be readily enlarged if one geographical article were read and noted every week. The usefulness and application of the notes will vary greatly. The item given above about the monsoon and the forest would find ready listeners in a class of young pupils. The account of the prison is too shocking for literal repetition, but a teacher who calls races "barbarous" because she knows that their practices are such as are here described, instead of merely because she has found them so labelled in a text-book, will give an emphasis to her mention of them that will impress her hearers.

Geographical journals are more or less accessible to teachers in large cities through the public libraries. They are less commonly to be found in school libraries than could be wished. In small cities and villages they are rarely seen. In their absence, the editors of this JOURNAL hope to introduce in its pages something of

the materials that the larger journals contain, always selecting its articles and abstracts with especial reference to their use by teachers.

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NOTES.

The Climate of Alberta.—" There is, we believe, great ignorance in this country as to the climate of this remote territory of Canada, and it appears from Dr. R. F. Stupart's remarks, who read a paper on the subject before the Canadian Institute (Trans., October, 1896), that almost as much uncertainty on the subject prevails in the Dominion. Mr. Stupart has studied and analyzed nine years' observations at Calgary and eleven at Edmonton. The difference between the means for the winter months in different years is very striking; for example, in 1891, the January mean was 20.9° at Edmonton, and 27° at Calgary, the former being about that of Toronto, while in 1890 the Edmonton monthly mean was 6.8° below zero, and the Calgary 3.5° below, or somewhere about the mean at Moose Factory, St. James Bay. The normal deduced from the eleven years' observations at Edmonton is 2.7°, and from the nine years' records at Calgary, 9.4°. In February the mean shows the same tendency to great variations. The normal is 5.4° at Edmonton and 12° at Calgary.

"At both stations the winter months are in some years excessively cold, but scarcely a month goes by without one or more intervals when the temperature rises to 40° or sometimes 50°. On seventeen out of the fifty-nine days in January and February the thermometer rises above freezing point at Edmonton, and on twenty-three days in Calgary. On the other hand, at neither station has there ever been a January in which the temperature did not fall 20° below zero, and 57° below have been recorded at Edmonton and 48° at Calgary. With March a marked improvement sets in, and the normal is 26.8° for Calgary and 23.7° for Edmonton, while in April it rises at both stations to 39.3°. Scarcely a year passes without temperatures of 70° being recorded in this month. On comparing the record with those of other parts

of the Dominion, it is seen that nowhere does spring begin so early as in Alberta. From May to November the temperature is lower than in the more settled parts of Ontario. The warmest month is July, with means of 60.5° and 58.8° at Calgary and Edmonton respectively, and maxima of 74 and 72.9°. The thermometer does not fall to zero till between the 15th and 20th of November.

"The annual precipitation is 14.16 inches at Edmonton and 12.85 inches at Calgary, the greatest portion falling in the form of rain between April and September. There is a great deal of sunshine, the cloudiness being only about seventy per cent. of that of Toronto. The amount is about the same in summer and winter, and gives a yearly average of forty-three per cent. of the possible."

—Scot. Geog. Mag. Jan., 1897.

Occupations of Americans.—" Much interesting data about the occupations of the American people is given in a bulletin of the eleventh census just made public. It shows that the total number of people engaged in occupations of all kinds in 1890 was 22,-735,661. Of the whole number of working people the female form 17.22 per cent. Divided by classes the working people of the country are as follows: Agriculture, fisheries and mining, 9,013,336; professional, 944,333; domestic and personal service, 4,360,577; trade and transportation, 3,326,122; manufacturing and mechanical industries, 5,091,293. Considerable more than four-fifths of the illiterate male population of the country and over one-fourth of the illiterate female population are working. Over 59 per cent. of the workingmen are married, over 37 per cent. single, over 3 per cent. widowed, and one-quarter of 1 per cent. divorced. In manufactures and mechanics the carpenters and joiners, numbering 611,482, make up the greatest element, with dressmakers and milliners following, with 499,690. little over 1,000,000 bookkeepers, clerks and salesmen, 690,658 merchants and dealers, 5,281,557 farmers, planters and overseers, and 3,004,061 agricultural laborers, 349,592 miners, and only a little over 60,000 fishermen and ovstermen. Professors and teachers, aggregating 347,344, form the most numerous of the professional classes. Physicians and surgeons, 104,805, come next: then lawyers, 89,630; clergymen, 88,203; government

officials, 79,664; musicians, etc., 62,155; engineers and surveyors, 43,329; artists and art teachers, 22,496; journalists, 21,849, and actors, 9,728."—Bradstreets, N. Y.

Geographic Names.—The "United States Board of Geographic Names" consisting of delegates from the various government departments and bureaus interested, attempts to decide as to the proper form to be used in case of words that have many different spellings.

Geographic names undergo change, and a reversion now to the original spelling is in many cases out of the question. Hence, so far as possible, local usage determines the spelling to be accepted and adopted in government publications. The better text-books now follow the official spelling given by the Board.

The following paragraph from the National Geographic Magazine of July, 1896, will show some of the changes that names have undergone in the last century:

"An example of corruption is seen in the name Bobruly, applied to a creek in Missouri. The original will, of course, be recognized as Bois Brulé. Again, Rum river, Wisconsin, was originally the St. Esprit, which, translated, became Spirit river, and thence, by some pundit, rendered in its present form. For a whole century Wisconsin was spelled Ouisconsing. Would there be any right or propriety in reverting to that spelling and requiring the citizens of the Badger State to adopt it in place of the present form? Shall we attempt to revive the name Illinios or Illinovacks in place of Michigan, for one of the Great Lakes, Ouabash for Wabash, and apply it to the Ohio river, or call it La Belle Riviere? Should we substitute Kichi Gummi, Grand Lac, Tracy, Conde, or Algona for Lake Superior, and Ihankton for Yankton? Shall we call the Mississippi the St. Francis, the Colbert, the Conception, or the St. Louis? Shall we change Missouri into Missouries or St. Philip, and Iowa into Ioway?"

The Board has decided to drop final h from all words ending in burgh; ugh has been dropped from borough. Center is the spelling, and not centre, in geographic names.

The Board has already published a number of its decisions, and in case of doubt reference should be made to the official re-

ports. It is to be hoped that there may be greater uniformity in spelling in the future among geographers. R. E. D.

Tidal Power.—"One of the first attempts to make practical use of the great energy of the tides is now being made on the Pacific Coast at Santa Cruz. A dynamo costing about \$20,000 is now being placed in position. It will be worked by a head of water raised by the tide, and the electric energy thus obtained will be employed in lighting the town and driving the street cars. That, at any rate, is the idea, although whether it can be successfully carried out remains to be seen. It should be noted that, if this plan is successful, the energy that will light Santa Cruz and propel its cars will be derived, not like that which lights other places, from the sun, through the intermediary either of fuel or of waterpower, but from the earth's rotations; for, though the attraction of the sun and moon raises the tidal wave, it is the rotation of the earth that gives it its energy."—Popular Science News.

Aconcagua.—"A brief dispatch dated Mendoza, Argentina, January 17, and addressed to the London Chronicle, announces that the famous Swiss guide and alpinist, Mattias Zurbriggen, the associate of Mr. (now Sir) William Conway in his remarkable tours among the high Himalayas, and at the present time the main reliance of the FitzGerald expedition to the Chilian and Argentine Andes, successfully reached the summit of Aconcagua on the 14th of the present month. This possibly makes a "record" in mountaineering, and the claim may be true that by this ascent the loftiest mountain of the Western Hemisphere has been conquered. Güssfeldt made an attempt on the mountain in 1883 and reached an elevation of 21,089 feet. As to the position of Aconcagua in the series of highest summits of the Andes, some little uncertainty According to the determinations of Captain Fitzroy, made during the famous cruise of the Beagle, the elevation of this extinct volcano is 23,910 feet, a value which is to be found in nearly all English publications. The Spanish engineer, Pissis, many years later, reduced this elevation to 22,422 feet, which again was advanced by Güssfeldt to 22,860 feet. probable that the later measurements are more nearly correct than those of Fitzroy, and if this be proved to be so, then the "record"

of mountaineering not improbably remains with Mr. Conway, through his conquest of Pioneer Peak (about 23,000 feet?), in the Karakoram Himalayas. As to Aconcagua being the highest summit of the New World, its place is more likely second or third. The Nevado de Sorata, or Illampu, on the Titicaca plateau, almost certainly surpasses it, and not impossibly by fully 2,000 feet; and its neighbor Illimani has seemingly a just claim to be considered in the same comparison."—Nation, January 28, '97.

Northern Bolivia .- "The chief natural wealth of this country The exportation of this article is of is, of course, india rubber. comparatively recent origin in the Bolivian territory, and even twenty years ago hundreds of natives were carried off by force to work in the forests of Brazil, leaving their wives and children in the greatest misery. Since then, india rubber has been collected by several firms in the Bolivian territory, and the natives are no longer kidnapped, though occasionally they seem to be treated cruelly. The great obstacle to the development of the trade is the obstruction of the rivers by rapids. At present, about five per cent. of the goods carried along the rivers are lost by the foundering of the boats, and the loss of life is also considerable. difficulty will soon be overcome, in part at any rate, by the construction of a road along the Maderia and Mamore, from San Antonio to the fall of Guajara-merim.

"The india rubber tree of this country is called by the Portugese seringo, because the juice is used by the Omaguas to make syringes—playthings much used in their festivals. Hence also its botanical name, Siphonia elastica. It grows on an average to a height of sixty to seventy-five feet, and has a regularly cylindrical trunk, with a graceful spherical crown. The juice is extracted by making incisions in the bark under which are placed tin cups. It is then dried in the smoke from a fire of the fruit of two kinds of palm, known as cusi and motacu. If allowed to coagulate of itself, the article is of inferior quality. Of late years about 680 tons of india rubber have been exported annually from the Bolivian territory alone."—Scot. Geog. Mag., January, 1897.

The Antarctic Regions.—In a very interesting account of the Antarctic Regions, by Professor Angelo Heilprin, in Appleton's

Popular Science Monthly for January, 1897, is an excellent summary of the knowledge regarding these remote insular or continental lands, nearly all of which, so far as known, show volcanic activity of great vigor. Perhaps, the most helpful paragraph for teachers, is the following concerning climate.

"The distinctiveness of the Antarctic climate as compared with the Arctic is found in the relations of both the summer and the winter temperatures. The high summer heat of the north, which, in the few months of its existence, has the energy to develop that lovely carpeting of grass and flowers which gives to the low-lying lands, even to the eighty-second parallel of latitude, a charm equal to that of the upland meadows of Switzerland, is in a measure wanting in the south; in its place frequent cold and dreary fogs navigate the atmosphere, and render dreary and desolate a region that extends far into what may be properly designated the habit-The fields of poppies, anemones, saxifrages and mountain pinks, of dwarf birches and willows, are replaced by interminable snow and ice, with only here and there bare patches of rock to give assurance that something underlies the snow covering. Man's habitations in the northern hemisphere extends to the seventy-eighth parallel of latitude, and formerly extended to the eighty-second; in the southern hemisphere they find their limit in Fuegia, in the fifty-fifth parallel, fully three hundred and fifty miles nearer to the equator than where, as in the Shetland Islands, ladies in lawn dresses disport in the game of tennis. And still seven hundred miles farther from the equator in Siberia, Nordenskjöld found forests of pine rising with trunks seventy to one hundred feet in height. Yet it must not be supposed that there are not, as is perhaps commonly assumed, gleams of warm sunshine in this inhospitable south; indeed, we have yet to learn to what extent the far south is warm and cold. Thus, Captain Kristensen, the gallant commander of the Antarctic, who made the first landing on what is assumed to be the mainland of Antarctica, asserts that on January 5, 1895, when nearly on the sixty-eighth parallel of latitude, "the sun at noon gave so much heat that I took my coat off, and the crew were lying basking in the sunshine on the forecastle." (Transactions of the Royal Geographical Society of Australasia, Victorian Branch, March, 1896, page 87.) And Bis-

coe, writing on the 16th of January, 1831 (on approximately the sixtieth to the sixty-third parallel of latitude), states that "the temperature of the water was 34°, of the air in the shade 45°, in the sun 77°, with a corresponding general warmth to the feelings of the crew." The highest reading of the thermometer for the month of January was noted by Kristensen to be 40° F., and the lowest 27°; fifty-three years earlier (1842) Ross found for the same month 39° and 27.5°, with a mean of 32°, thus indicating an equality almost without fluctuation.

The fact that the high south has not yet been penetrated in the winter months leaves us in uncertainty as to the winter temperatures that may prevail there; but some indications of this temperature are to be found in the records which have been obtained in the circumantarctic tract. Ross registered the absolute minimum, for the year 1842, in the Falkland Islands to be only 19.2°; but still more significant is the reading of the minimum thermometer which was left by Forest in 1829, on Deception Island, and recovered by Captain W. H. Smiley (as reported by Wilkes) in 1842, or after an interval of thirteen years. The registry was found to be -5° F. It is true that Deception Island lies without the Antarctic Circle, and that its insular condition must measurably reduce the rigors of a winter climate; but even these conditions permit us to form some just estimate of what "lies beyond," and of making some interesting comparisons with corresponding localities (so far as latitude is concerned) in the north. Thus, at Fort Reliance, in North America, the mercury descends to - 70° F., and at Yakutsk, in Siberia, nearly one degree nearer to the equator, to - 75°; and if we are to fully believe the registry at Verkhojansk, for the winter of 1893, the unprecedently low temperature of — 90° was reached. But one need not make comparisons with these especially cold localities, as it is well known that at the sites of the principal commercial cities of the world the mercury at times descends to from -5° to -15° (New York and Philadelphia, 1866, 1895). On January 23, 1823, the mercury in Berlin descended to -31° F., and in Paris on January 25, 1795, to -21°. It is perhaps just to conclude from these and other facts that the extreme winter climate of the Austral Ocean, on or about latitude 63° south, is no more severe than that of southern

France, and hardly more so than that of northern Italy. And while it is doubtless true that a considerably lower marking of the thermometer would be found in the much more extreme regions of the south, or nearer to the pole, it is practically certain that nothing comparable to the cold of the opposite face of the globe exists."

R. E. D.

The Lakes of Florida.—"The peninsula naturally separates into three divisions: the middle portion, which comprises the beautiful lake region; the west coast, which slopes away from the high ridge to the Gulf of Mexico; and the east coast, whose sandy levels are protected from the Atlantic by the great coquina atoll, extending from the mouth of the St. Johns river to the shores of Lake Worth. Each of these divisions differs wholly from the others, presenting conditions and characteristics peculiar to itself.

Middle Florida is a broad ridge which reaches, at places, an elevation of nearly 250 feet. The soil is, for the most part, sandy, but, like that of the State in general, it contains a sufficient quantity of phosphate to render it fertile. Forests of pine are everywhere. Here and there a cypress swamp varies the scene, and now and then a palmetto hummock suggests the approach of the tropics, It is in this division the lake region is found. Dotting the landscape, like jewels of crystal in a field of green, are numberless lakes, varying in size from a gem-like lakelet to the broad expanse of Within a radius of 5 miles from Winter Haven 100 have been counted, and within 7 miles of Orlando there are known With Gainsville as its northern limit, and including lake Okeechobee on the south, this region contains, as a conservative estimate, at least 30,000 of these lakes and lakelets."— National Geographic Magazine, Dec., 1896.

The Sage Plains of Oregon.—The vegetation of the great plains in Oregon between the Bitter Root and Cascade Mountains "consists primarily of sage brush, a shrub three to six feet high, closely related to the wormwood of Europe and having, in common with that plant, a light gray color and a strongly aromatic odor. Away from stream beds and sinks and the shores of lakes, sage bush covers the whole country like a gray mantle and constitutes probably nine-tenths of the total vegetation. It is a plant, the

herbage of which is eaten by but few animals and by those only in starvation times, one that will grow with little moisture and will stand the widest range of temperature. Sage brush gives to the country its character. A level stretch is known as a sage plain; the grouse which live there are known as sage hens; the fuel of the region is sage brush; the odor upon the atmosphere is that of sage brush."—National Geographic Magazine, Dec., 1896.

New Jersey Forests and their Effects.—Much debate has arisen within a few years concerning the influence of forests upon floods and droughts and upon other conditions of streams determining the success of man in agriculture or commerce.

The recent report on forestry of the State of New Jersey brings out most forcibly the value of large forested areas in the catchment basins of water for large cities. Cultivation necessarily means presence of population that would naturally pollute the water of streams, and also means the loosening of soil, so that the draining streams would be roily. The rivers in the northeast highlands of New Jersey are in a forested area and are much more clear and drinkable than the rivers to the southwest, where cultivation is more extended.

The flow of streams is also more regular from the forested than from the barren or cultivated watershed. Floods are heavy and frequent under the latter conditions. "The economic importance of this lies in the greater value of forested streams for water power and the smaller storage reservoirs needed therein to furnish a given supply of water to cities. Illustrative of this the Passaic river (forested) will furnish for nine months of the year from 100 square miles of watershed, 45 horse power on 10 ft. fall, whereas the Raritan (cultivated) will furnish but 41 and the barren watershed 28. During the other three months the Passaic will furnish an average of 36, the Raritan 32, and the barren watershed 20 horse power."

Maps in History.—Mr. Henry Gannett, of the United States Geological Survey, has an interesting article in the Bulletin of the American Geographical Society, Vol. XXVIII., No. 3, entitled a Graphic History of the United States. In it he gives, by a series of maps, the history of the changes of territory of the different

States of the Union. For instance, New York is shown both before and after its reduction by the separation of Vermont in 1791. The most interesting cases given are those of States which formally claimed land indefinitely westward. For instance, Kentucky was cut from Virginia in 1782; West Virginia in 1863. Georgia was decreased in 1802 by separation of all of Alabama and Mississippi lying north of 31st parallel. Louisiana comprised all the basin of Mississippi on the west of the stream, south to head of Arkansas in Colorado, eastward to 100th meridian and south to Red river, and down this river to present confines of Louisiana, which was followed to Gulf. Indiana once included Illinois, Wisconsin, Michigan and part of Minnesota. Other States have suffered similar losses, all of which are interesting and the understanding of which is necessary to one who would give some meaning to geographic boundaries as they are mechanically memorized in many schools. R. E. D.

Recent Geographic Changes in Switzerland .- Prof. Edward Brückner has recently described in Petermann's Mitteilungen the very interesting results of a comparative study of a remarkable map of the seventeenth century and one of the Swiss survey maps of to-day. In 1667, Mr. J. C. Gyger completed his map of a part of the Alpine region extending from the Rhine on the north to the Reuss on the south, and including the whole of the canton of Zürich in Switzerland. The map was on an unusually large scale for that time. The scale was 1:32,000, or one inch on the map for about a half mile in nature. He worked compass in hand, paced his distances, and was very careful and laborious in his survey. He gave a great deal of time for thirtyseven years to his map. He was the first to use lights and shadows to indicate and contrast mountain slopes. Two copies of his map, both signed by him, are extant, and they still excite the admiration of cartographers for the wonderful accuracy with which they depict topography. Until this century the Gyger map was regarded as the best cartographic delineation of the Zürich canton. Small parts of it have been published with corresponding sections of the present surveys, to show the high standard of accuracy Mr. Gyger attained.

Mr. H. Walser has carried out, in the Geographical Institute of the University of Berne, the comparison between the Gyger map and that of the present day. Mr. Gyger carefully showed every lake, large and small, in the canton and sharply distinguished the lakes from the swamps. His map showed 149 lakes in the canton. Of these, no less than seventy-three are not found on the present maps. These lakes, as Mr. Walser points out, one by one have become extinct. They were all small, most of them having an area of less than twenty-five acres. The area of sixteen other lakes is now much reduced, and twenty others are somewhat smaller than in the seventeenth century. Forty lakes have undergone no important change.

Mr. Walser has ascertained by observation the causes of the shrinkage or disappearance of fifty-four of these lakes. The farmers, in their efforts to secure more meadow land, have played an important rôle. They have drained quite a number of the lakes and turned their beds into hay farms or pasture lands. Of course, in geological time, all lakes are drained by the natural cutting down of their outlets, but, on account of the unimportant slope of the outlet channels of these particular lakes, the deepening of the channels was very slow, and this form of lake effacement seems to have cut no figure.

The effect of two other natural causes, however, are very evident. One was the silting up of the lakes by the deposit of sediment, and the other, and more important, the gradual encroachment of plant life in the lakes, which finally completely filled them, the decay of vegetation forming soil, and thus the lakes were gradually extinguished. Some of the lakes are still undergoing this process, the carpet of plants extending all around the shores, while a little water surface is still visible in the center. The deposition of sediment and the growth of plants which finally obliterated these little lakes were, of course, supplemented, as Mr. Walser says, by the human activities that, in the past century, largely cut off the water supply that made and fed them.

Mr. Gyger very carefully showed the forests on his map, and the comparison that has now been made between the area of forests in the canton two centuries ago and at the present day is very interesting in view of the statement, often heard, that Europe is gradually undergoing deforestation. Proof is afforded that, at least in this district, the forests have just about held their own. Two hundred and forty years ago, according to the Gyger map, there were 132,500 acres of forests in the Zürich canton. There are now 120,000 acres of woodlands, or, in other words, the forest area has been depleted only about 10 per cent. since Mr. Gyger made his map. The steeper slopes are still wooded as they were, except here and there where woods have given place to vineyards. The forests have increased on the flood plains of the rivers, and and also on the hill slopes near the Rhine; they have held their own in the northwest part, and in the region of the lower Töss, while the wooded area has been reduced a fourth in the Jona district.

NOTES.

Mr. Gyger also delineated on his map the areas given to wine culture, from which it appears that the increase in the amount of land devoted to this industry at the present time is about 25 per cent. As a rule, wine culture is not attempted now on shaded slopes and at a high altitude to so great an extent as it was two centuries ago.

A very noteworthy recession of the lake area, very little change in the extent of the forests, and an important increase in wine culture in the canton of Zürich are the most important changes which have been brought to light by this interesting comparison of maps.—C. C. A., in New York Sun.

Population of Budapest.—An interesting case in which the growth of a town is shown to be dependent upon the physical features of its location is that of Budapest, noted in The Geographical Journal for January, 1897. This town consists of about 77 square miles of country, largely on the right bank of the Danube. Previous to 1874, Budapest consisted of two towns, Ofen (Buda) and Pest. Since 1840 Ofen, the older town on the mountain side (the best situation for defence) has scarcely doubled its population, while Pest, on the alluvial plain (where agriculture and growth is more possible) on the left bank of the river, has become about six times as large.



THE

JOURNAL OF SCHOOL GEOGRAPHY

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

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Mss. intended for publication, books, etc., intended for review, and all correspondence, except concerning subscriptions, should be sent to the reponsible editor, Richard E. Dodge, Teachers College, 120th Street West, New York City.

NOTES FOR TEACHERS ON THE GEOGRAPHICAL DISTRIBUTION OF PLANTS.

It is not possible within the compass of a brief paper to set forth adequately the principles of plant geography. I hope, however, within the space allotted me, to demonstrate one or two propositions and suggest directions in which inquiry may be profitable. First of all a few general definitions may be of advantage. Plants, like people, may be regarded individually or collectively. The plant is a vegetable person; the plant-formation is a vegetable community. Just as various degrees of aggregation in human society may be studied—as, for example, the individual, the family, the ward, the city, the state, the nation, the international Bund, the stock, the race—so in plant-society one may distinguish the individual, the family (not in the sense of the systematist), the formation, the aggregate (forest or prairie for example), the flora and the general continental population.

It is highly important to take this fact into the mind: The presence of a given plant at a given point is quite as complicated a phenomenon in its way as the presence of some particular man at a designated spot. Each fact is a result from a very complex series of natural causes and conditions. Therefore it appears that

plant distribution may be studied from two principal points of These are designated (a) floristic plant-geography and (b) ecologic plant-geography. The former provides a census of the kinds of plants in a given region and has its importance; the second provides a rationale for the appearance of particular plants or groups of plants on particular areas. Under the first discipline plants are conceived to be of interest on account of their specific and varietal differences, and extensive lists and analysis rules and terminology have been provided for scientific discrimination of the different sorts of plants in different regions. Descriptive floras are extant, some covering limited areas like counties or public parks, while others, like Bentham and Mueller's Flora Australiensis, cover whole continents. But under the second discipline plants are conceived to be of interest as representing adaptation in all cases to definite though complex environmental influences. The position, relative abundance, life-habits, range and character of the plant are regarded as an expression of certain adjustments between it and its ancestors on the one hand and its past and present surroundings on the other.

Hence there have been indicated what are termed the ecological factors in plant distribution, and the study of these factors in their relation to plants, together with the study of plant stations, habits and ranges constitute what has come to be known as ecologic plant distribution. Among the principal ecologic factors are atmospheric light, heat, vapor-content, wind, precipitation and density; soil illumination, temperature, saturation, cohesion, chemical construction, physical structure and nutritive qualities; also direction of atmospheric, aquatic and soil currents (of the latter avalanches and sliding bogs may be regarded as examples) relief of soil, slope, irregularities, elevation, and all the various conditions termed topographic. Besides these there are the complicated factors depending upon the struggle for existence between individuals, community-groups, formations and aggregates. arise curious relationships like those between the oak and the mistletoe, between the fir-trees and the witches-brooms or between the willow and the dodder. Relations such as these exist also between plants and animals as between the yucca plants and the vucca moth, between leaf-eating ants or boring beetles and the

fungus gardens which they cultivate and upon which they live, between acacias and ants, between clover and bumble-bees, between carrion-fungi and burying beetles, and in a host of ways too numerous to indicate in a short article like this.

In a word, the problem of a plant's location is by no means simple, but demands for its solution the most enlightened knowledge of meteorology, topography, geography, biology and other sciences, together with an accurate general survey of the history of both the species and substratum. To illustrate what I mean, a concrete example, that of certain small cacti of the genus Opuntia, which are established in the valley of the Saskatchewan far north of the bulk of their kind, may be selected. An exact interpretation of their presence on sundry exposed rocky tracts and their habits of life draws one into an examination of the valley as a whole, of the ancient lake Agassiz which once covered the land, of the glacial and post-glacial climate, of the herds of grazing animals-such as the bison, of the arid conditions under which the ancestors of the modern individuals developed their succulence and their spiny armor, and of numerous other matters, all of which have a direct and important bearing upon the question which it is proposed to answer.

It must then be apparent that the explanation of a landscape of forest, swale and meadow is a proper field for scientific as well as artistic endeavor. Notwithstanding the ultimate difficulty of the problems certain general facts can be derived, and these I shall attempt very briefly to develop from fundamental propositions as follows:

The surface of the earth is an exceedingly heterogeneous area occupied by plants and animals. Plants are relatively static organisms in which constructive chemical processes predominate with a consequent tendency rather towards accumulation of matter by synthesis than towards liberation of energy. Animals are relatively dynamic organisms in which destructive chemical processes predominate, with a consequent tendency rather towards liberation of energy by analysis than towards accumulation of matter. Hence, in general, animals are automobile, while plants are not. Hence, also, animals structurally show specialization into an anterior or forward-moving end and a posterior or following-after end

—that is, into head and body. But plants, on the other hand, are structurally specialized into a fixed end and a free end—that is into root and shoot. Hence, further, animals in general develop bilateral symmetry of form, while plants develop radial symmetry and the total weight of all the plants of the world as greatly exceeds the total weight of all the animals, as the dynamic force for equal masses and equal times of such an animal as man exceeds that of a young oak tree.

A broad classification of the earth's surface is into sea and land. Fixity of position becomes more characteristic of land organisms than of aquatic. Hence the fauna is more conspicuous in the ocean, the flora more conspicuous on land. Again both plants and animals may be correspondingly classified as water denizens and land denizens. The inhabitants of the water may be further classified into two main groups, (a) the originally aquatic and (b) the adaptationally aquatic. For example, fish would appear to be originally aquatic, while seals, whales and manatees are adaptationally aquatic. So, among plants, the wrack and gulf weed are originally aquatic, while eel grass, pond lilies and duckweed are adaptationally aquatic. Originally aquatic organisms are those possessing an unbroken line of aquatic ancestors. Adaptationally aquatic organisms are those with more or less remote terrestrial ancestors, but themselves specialized for life in the water. It is interesting to notice that all aquatic flowering plants are adaptationally aquatic. Some, like the water buttercup, show but slight modification from the terrestrial habit, while others, such as the Podostemons are profoundly modified and simulate in appearance the originally aquatic algæ.

An examination of aquatic floras will serve to convince one that adaptationally aquatic plants characterize inland bodies of water and streams rather than the ocean. Thus while fresh-water species of mosses and ferns are known, and occur abundantly, there are none of these plants established in the sea and, save a few flowering plants like Zostera, the oceanic flora consists of originally aquatic algæ. Fresh-water areas, however, being numerous, isolated from each other, existant under various conditions of temperature, illumination, solutions, depth, population and duration in time, have given occasion for a rich series of forms extending from the arctic regions to the equator.

It becomes apparent then that the development of flowering plants, ferns and mosses in fresh-water tracts is an *adaptational* phenomenon, and, perhaps, this acquired aquatic habit and distinctive selection of habitat nearer or farther from shore is as convenient a field of elementary ecologic research as any.

Selecting then a circular pond in which the shore slopes regularly toward the center, one may examine the location of the flowering plants. As pointed out by Magnin, zones of vegetation are seen to be established. These, as described for the small lakes of the Jura are commonly six in number, beginning at the water's edge, as follows: I. Zone of sedges, II. zone of reed grasses, III. zone of bulrushes, IV. zone of pond lilies, V. zone of pond weeds, VI. zone of bass weed (Chara). The VI. zone is entirely submerged and must be located by a small dredge or long handled rake. Often in small sheltered ponds, where the wind has not too free sweep, a central area of duckweed and bladderworts is to be These zones are capable of various modifications in the typically regular pond; for example, in northern Minnesota I have seen many lakes where formations of scouring rushes took the place of the bulrushes, and elsewhere Spiraea or Polygonum may occupy the station ordinarily characterized by the reed-grasses.

This zonal distribution, regular in a regular bowl-shaped pond, but interrupted and irregular in ponds where the bottom is uneven, evidently expresses an adaptation between certain kinds of plants and definite maximum and minimum depths of water. one stands and looks from the water's edge towards the land, he will very likely discover that surrounding the pond, if the banks slope regularly away to the higher land, there are similar zones of vegetation. First, perhaps, there will be a zone of grasses and small herbs; second, a zone of coarse herbs, golden rods and epilobiums, it may be; third, a zone of shrubs, such as willows or wild plums, or roses; fourth, a zone of larger shrubs or trees-but the species in each zone will depend upon what part of the earth one is studying. Juxtaposition of particular species depends then, largely, upon biological history and past plant wanderings, but juxtaposition of formations depends largely upon topography and physiography.

If, instead of a regularly circular and bowl-shaped pond, we select

a dome-shaped hill, a similar zonal distribution of plants may commonly be noted. This is seen on a grand scale in the zones, due to variations in altitude, marked out on mountain peaks, but in small hills the zonal distribution arises through adjustment to different wind exposure, illumination, soil and irrigation.

I have elsewhere made the generalization that, where the topographic feature upon which plants are distributed is radially symmetrical, there will be a tendency toward zonal distribution. This is as true of elevations as of depressions, as true of lakes as of hills. But where there is no radial symmetry in the topographic feature no zonal distribution can be discovered except under certain very definite biological conditions. For example, a zonal distribution of mushrooms is seen in the "fairy rings" of flat meadows, but this is an indication of distribution from a common center. There is therefore nothing zonal in the distribution of the Russian thistle over the flat fields of the Dakotas, except as isolated individuals may have formed centers for propagation.

These two types of the establishment of plants in a given district, the zonal and the azonal are capable of wide combinations and variations. Rarely does one find a marsh, a hill, or lake exactly symmetrical; differences in the sides, irregularities, breaks in shore lines or gullies, or boulders intervene to destroy the hypothetical symmetry. Yet, having once seized the main fact, all of these special conditions are not confusing. Many of them may be comprehended and their influence upon the plant distribution seen at a glance.

The lines where one formation of plants abuts upon another have been termed "tension lines," because the tendency of every plant formation is to extend itself. A very interesting study of the struggle for existence may be made by keeping a census from year to year of the population of such tension areas and the laws under which one group of plants encroaches upon another may be thus made out.

It seems to the writer that such study of plants as has been hinted at in these few pages is of more value in secondary schools than the ordinary herbalism.

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THE CLIMATE AND GEOGRAPHY OF NEW YORK STATE.

A knowledge of local climate furnishes one of the most valuable aids in teaching geography according to the modern conception. It constitutes the middle links in the chain of causal relations extending from the natural features of a region, through its climate and conditions of soil and vegetation, to the daily life and industries of the inhabitants. It lends added interest to home geography, and helps to lift the whole field of geographical study above the plane of mere memory work.

In the United States, happily, this knowledge of local climate is being furnished by the various state weather services. Sufficient data have been gathered in New York, in particular, to furnish a fairly accurate conception of the climatic features of the State. This data consists mainly of records of the daily observations taken at the various weather stations since 1889. These may be found in the Annual Reports of the New York Weather Bureau. The Fifth Annual Report contains, also, an admirable discussion of the climate of the State by Mr. E. T. Turner. Other interesting records of the weather previous to 1889 are contained in the Annual Reports of the Board of Regents; and an article on the Climate of Chicago, by Hazen, Bulletin Ten, U. S. Weather Bureau, while not concerned directly with New York, is suggestive in dealing with the climatic influences of the Great Lakes. The present article aims to give a brief description of the climate of the State, as obtainable from these sources, and to point out its dependence upon local natural features. The accompanying figures are taken from the article by Turner, mentioned above.

The climate of New York State, as a whole, partakes of the main characteristics exhibited by all eastern coasts of the north temperate zone: cold winters and warm summers, with a wide range and great variability in temperature combined with large fluctuations in rainfall. Annual ranges in the actual temperatures recorded of over 100 degrees for all stations and of 130 degrees or more within the State, are not infrequent. Thus in the

comparative charts of Buchan, New York is represented as having an average annual temperature about the same as that of England, Germany and southern Russia, with a range of over 50 degrees, from a July average comparable with northern Spain, southern Europe and Japan, to a January average which approximates the temperatures of such regions as southern Greenland, Iceland and Norway.

The reason for such widely different conditions is mainly to be found in the seasonal change in the direction of the prevailing winds. In winter, the interior of the continent becomes relatively much colder than the oceans. At this season, therefore, the high pressure belt overlying the Atlantic at approximately 30 degrees north latitude is extended up over the interior of North America, through the cooling and contracting of the air over the land, and the piling up which results as the surrounding air flows in above. The center of this great continental "high" lies nearly over the province of Manitoba, and, since the corresponding area of low pressure is situated in the North Atlantic with its borders reaching almost to our northeastern coast, cold, northwest winds sweep over the eastern portion of the United States.

In summer, on the other hand, the land heats up rapidly until it is warmer than the ocean, and a "low" replaces the winter "high." This area, joining the constant "low" of the north Atlantic, receives the winds from out the tropical region of high pressure, giving them a component from the south. The summer winds are, therefore, warm and ladened with moisture from the Gulf and Atlantic Ocean. These give to New York the warm temperature and generally heavy precipitation of the summer season-

To this apparently regular shifting of the winds with the seasons, must be added the local disturbances which accompany the passage of cyclones (low pressure areas) and anticyclones (high pressure areas) over the State. A reference to the charts published by the *United States Weather Bureau* in the *Monthly Weather Review*, will reveal the fact that the usual track of the cyclones is just north of New York, that of the anticyclones either across the State or just to the southward. Such a position on the border line between the two systems leaves New York peculiarly exposed to the effects of these areas, with their characteristic, shifting winds

and rapid changes in temperature. Great variability in the sort of weather experienced from day to day follows, and occasionally, also, very remarkable conditions, such for example, as that which occurred January 11, 1890, when the temperatures in the northern part of the State averaged 53 degrees lower than those for places on the Pennsylvania border.

With this brief explanation of the influences which act upon the whole State in mind, the varying character of the local climates will be readibly ascribable to modifications in the general conditions brought about by certain local features. The chief agents in controlling local climate in New York are thus the ocean, the Great Lakes and any considerable irregularities in topography.

The lack of any high barrier in the west allows the influence of the interior of the United States to sweep eastward over the State, giving it a prevailing continental type of climate. It is only at regions very close to the coast that even an approximation to a maritime climate is found. The extreme eastern end of Long Island is subject to the most marked oceanic control, as is shown by its relatively small seasonal range. From there, westward, a rapid decrease in the degree of influence is shown. New York City, for example, has a range some five degrees greater than that of Block Island, which may be taken as representing eastern Long Island. Still further inland, the influence of the ocean is noticeable mainly during the passage of cyclones, when the winds from the coast are drawn into the interior. This, however, is sufficient to produce an equalizing effect amounting to eleven degrees upon the whole coast region, as compared to the St. Lawrence Valley. Table I. shows these condition and also the small range of Block Island as

TABLE I.

STATION.	Avg. Temp. for Jan.	Avg. Temp. for July.	Avg. Temp. for year.	Range
Block Island	31.2°	68.8°	49°	37.6°
New York City	30.6°	73.5°	51.6°	42.9°
MaloneTrue Maritime Climate	15°	68°	42°	53°
(Bermuda Islands) True Continental Climate	61°	79°	69.6°	18°
(Moorhead)	1.5°	67.9°	36.8°	69.4°

compared to that of a station in the St. Lawrence Valley, removed from the influence of the ocean. Types of maritime and continental climates are included to furnish a basis for comparison.

Other noticeable climatic influences exerted by the ocean are found in the late seasons and uniform rainfall of adjacent regions. Spring and autumn are computed to be twelve days later at Block Island than in the interior of the State, and a similar, though less marked, effect is found all over the coast.

The precipitation over the interior of the State is of the continental type: very fluctuating and with a maximum in summer when convection is greatest and the prevailing winds are bringing moisture from the Gulf and Atlantic ocean. The influence of the ocean overcomes this along the coast to the extent of rendering the seasonal fluctuation very slight and dependent upon the passage of storm areas. At Block Island the winter maximum of the true maritime type appears. Table II., compiled from the averages given by Turner, shows these conditions in detail.

TABLE II.

REGION.	PERCENTAGE OF ANNUAL AMOUNT IN INCHES.				
	Spring.	Summer.	Autumn.	Winter	
Interior of the State	23.5	30	25.8	20.7	
Atlantic Coast	24.8	27.3	25.3	22.6	
Block Island	24.5	21.3	26	28.2	

The Great Lakes exercise a control over the climate of New York similar to that of the ocean. Their situation on the western border of the State, the direction from which the winter winds are received, give them particular influence over the temperature of that season. As a result, the whole southern shore of Lake Ontario is maintained during midwinter five degrees warmer than the northern shore; and the cold waves which sweep from out the northwest are frequently so tempered during their passage of the lakes that they reach western New York twenty degrees or more milder than they were on the Canadian side.

The comparatively small mass of the lakes causes them to follow seasonal changes in insolation much more rapidly than does the ocean; hence their influence in retarding the seasons is less marked. That it is considerable, nevertheless, is shown by the unusually cool springs and late autumn frosts of western Chautauqua county. These conditions, coupled with the mild winters of that region caused by the warm lake winds blowing against the gently sloping hills, produces one of the mildest climates of the whole State. It is particularly favorable to grape growing also; hence this section is commonly known as "The Chautauqua Grape Belt."

Notable effects of the Lower Lakes on the climate of western New York, other than those already mentioned, are seen in the excessive humidity of that region and in its prevailing winter cloudiness and heavy autumn and winter rainfall. The total rainfall of the Great Lake region is slightly below the average for the State.

The climate of interior lake regions may readily be inferred The lake will be warmer than the surfrom what has preceded. rounding land in winter and colder in summer. When not frozen over, therefore, it will tend to modify the winds as they pass over it. As the prevailing northwest winds of winter are turned aside by the surrounding hills and sent down the lake valley, localities on the leeward shore will receive the tempering effects of the water. In summer, when the winds in the lake valley blow in the opposite direction, this shore will experience the land breezes which have not yet been given to the cooling action of the lake. The opposite shore has, meanwhile, been subjected to the cold land winds of winter and the cool lake breezes of summer. The latter, though they produce cooler days, prevent the land from cooling so freely at night, and thus maintain a higher average temperature for the twenty-four hours. A difference in temperature between the two shores is, therefore, maintained throughout the year, and always in favor of the shore receiving the lake winds. In this way the prevailing seasonal winds of the central lakes, which blow toward Ithaca in winter and toward Geneva in summer, produce temperature differences at the two cities. The records give the total difference as 3.3 degrees in favor of Ithaca in winter and to 1.5 degrees in favor of Geneva in summer. difference in latitude and elevation furnishes a normal difference between the cities of about one degree only, the balance must be due to the influence of the lakes.

Elevations of land, as hills and mountains, are important factors of local climate on account of the control which they exert over temperature and rainfall. The decrease of temperature with the altitude was found by Turner to be fairly uniform over the State and to amount to 0.3 degrees per hundred feet in winter and 0.4 degrees per hundred feet in summer. Few statements can be made as to the relative temperature conditions on opposite sides of ridges, however, as the Weather Bureau stations in elevated districts are hardly numerous enough for accurate comparison. Where such ridges act as barriers, shutting off modifying winds as, for example, the winds from the lake in Chautauqua county or from the Atlantic in the southeastern highlands, a considerable difference in the climate of the two slopes doubtless occurs.

The effects due to vertical deflections of air currents are more easily detected. The chart showing the normal rainfall for New York gives the rainfall of the Champlain valley as much below the average, a deficiency at once ascribable to the fact that the moisture in the winds from the Atlantic is precipitated over the eastern slope of the Green Mountains. Beyond the Champlain valley again, the Adirondack highlands possess a rainfall of from 35 to 45 inches, while over the mountains, in the St. Lawrence valley, it decreases to 30 inches or less. Similarly, a marked increase in annual precipitation is indicated at Minnewaska and over the Shawangunk Mountains, with a decided decrease in the lower area beyond; and those slopes in southwest New York which are open to the moisture brought from the Gulf, up through the Ohio valley, have the comparatively heavy precipitation of 40 to 50 inches, while the region beyond falls below the average again, although helped out by the moisture from the lake.

A second group of climatic influence due to irregularities in local topography are those exerted by valleys. Two causes are here most prominent: the night winds of the valleys and the deflection of the seasonal winds until they follow the valleys.

In elevated regions which are cut by deep valleys, the radiation of heat from the hillsides on clear nights is often sufficient to cool the overlying air until its added density causes it to move down the slopes into the valleys. Cool night winds are thus produced in the valleys, which give low nocturnal temperatures and a

tendency to early autumn frosts. The valleys in the Adirondack highlands, the lake valley at Ithaca, and the Mohawk at Utica are notably subject to these effects. At Cooperstown, for a similar reason, frosts as early as the latter part of August are frequent. Were it not for the prevailing cloudiness of a great part of the State these conditions would exert an extensive effect on local climate.

The second cause, the deflection of the prevailing winds by the surrounding hills until they follow the channels of the valleys, gives to such regions as the Hudson valley, the St. Lawrence valley and the Mohawk valley peculiar local climatic features. Thus the Hudson and Champlain valleys are subject to prevailing winds from the south from May to October, and from the north during the balance of the year. The influences of the ocean are therefore carried inland in summer even to the northern end of the Champlain valley, while in winter, the cold from the north is brought almost to the coast. The seasonal temperature ranges are consequently smaller throughout the greater part of the valley than those of the interior of the State.

The winds in the Mohawk valley blow east and west. As a result, the western portion is exposed in winter to the effects of those winds which have crossed from Canada over the isthmus and the Niagara river and thus have escaped the tempering influences of Lake Ontario. Cold winters are therefore the rule. At the eastern end, where the valley opens into the valley of the Hudson, the conditions are similar to those already described for the latter region.

The St. Lawrence valley is for the greater part traversed by southwest winds throughout the year. It therefore partakes of the conditions existing in the Great Lake region in summer. In winter it is also open to the cold winds from Canada, which makes it the coldest area in the State.

It has been possible in the preceding to give only a mere outline of the climatic conditions of New York, and to point out how these conditions depend upon the natural features. The State as a whole has been considered, rather than a limited area, for the object has been to show the great possibilities which the study of local climate affords. In the statement of general principles thus

made, it is hoped that the teacher may also find suggestions for a more particular study of that locality which, to him, is most advantageous. New material will be available each year as the research of the State Weather Bureau becomes more specific and more widely distributed. The problem before the teacher of geography is not so much as to the progress which man has made in perfecting his own inventions and gaining power over his surroundings, nor has it to do merely with a description of those conditions already existing; it is rather as to the control which his surroundings have exercised and are continually exercising over man himself. The aid which a knowledge of local climate brings to a solution of this problem is found in the better understanding of the home locality which it furnishes, and in the insight which it grants into the climates of more distant countries.

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MISSOURI.

Missouri, covering an area of about 69,415 square miles, lies near the center of the region drained by the Mississippi river and its tributaries, and east of the geographical center of the United States, but almost equally distant from the Rocky and Appalachian mountains.

The eastern boundary is the middle of the channel of the Mississippi river, and the northern half of the western boundary occupies the same relation to the Missouri river. A few miles of the extreme eastern part of the northern boundary is formed by the Des Moines river, and on the western side, about 20 miles, of an offset in the extreme southeastern corner is formed by the St. Francois river. The rest of the boundaries are described as parallels of latitude and meridians of longitude. These lines were determined, however, at a time when accuracy in such work had not reached the degree now attained. The lines, as originally established, were marked by stone monuments placed at regular intervals. Later and more accurate determinations of the parallels and meridians designated have shown the old locations to

be slightly incorrect. The early locations, however, are recognized as the legal boundaries of the state, since these lines are definitely marked on the ground. It is slightly incorrect, therefore, to say that the southern boundary of Missouri is on the parallel of 36° 30' north latitude. Recent maps do not show the exact amount of deviation of the legal boundary from the true boundary along the western side of the state though they show that the deviation is perceptible. The northern boundary has not been mapped since the earlier determination. Several years ago a rather serious dispute arose concerning the location of the northern boundary. The original description stated that the northern line should follow the parallel passing through the rapids in the There are two sets of rapids in this river a Des Moines river. few miles apart. The commissioners who located the line originally adopted the most northerly set of rapids as the starting point. When the state of Iowa was organized it advanced the claim that the southern set of rapids were the ones designated in the description. The matter was finally settled by adopting the line claimed by Iowa.

Surface Features.—The surface features of Missouri consist of three divisions and are best discussed under the three heads separately. The first division includes the upland surface, its character, origin and shape. The second includes the larger subdivisions of the upland; the existence of lowland belts running across the state in directions more or less parallel, but which have no relation to the direction of the streams. The third division includes the features produced by the present streams; the valleys and hills cut beneath the uplands or some larger subdivision of the upland.

The Upland.—In considering this feature we are to imagine the features of the second and third divisions or the lowlands and stream valleys filled up. If that were done in Missouri we should have an even surface of great extent rising and falling in broad undulations. It would be a broad, remarkably even plain, an extremely monotonous surface unrelieved by mountain peaks or ridges. The upland, the existing part of this hypothetical plain of Missouri, consists of two parts; the Ozark region and the Prairie region. The Ozark region includes the greater part of the state

south of the Missouri river and the Prairie region the rest. The Missouri river may be considered the boundary line between the two divisions from its mouth to Glasgow. From that point the line turns southward, passing through Pettis, Henry, St. Clair, Vernon, Barton and Jasper counties.

The Ozark region lies south and east of this line. The eastern border of this region in Missouri is the eastern border of the state from St. Louis to Cape Girardeau. From that place the line turns southwestward by Poplar Bluff and a few miles further southwestward crosses the state line into Arkansas. It is a low, flat-topped, oblong, unsymmetrical dome, being longer in one direction than the other. The long axis runs across the state in a northeastward and southwestward direction, the northeastern termination being in St. Francois county and the southwestern end disappearing in Indian Territory. It crosses the state line into Arkansas from Barry county, Missouri. The point of greatest uplift in the dome is near its eastern end, so that the eastward slope is much more abrupt than the southwestward one. The slope at right angles to the axis is about equal on opposite sides.

The Prairie region in Missouri is merely the eastern border of the great eastwardly sloping plains of the western part of the Mississippi valley. In Missouri it is a plain sloping evenly to the southeast. The highest point is near the northwestern corner of the state and the lowest is along the Mississippi river.

Elevations.—The elevation of the Upland around the border of the Ozark region in Missouri is about 900 feet above sea level. The top of the dome varies between 1,500 and 1,800 feet above the same datum. The elevation of the eastern border of the Prairie region is about 800 feet, that of the northwestern part in the state is about 1,200 feet. Were it not for the modification of the upland by the features of the second class the increase in elevation northwestward would be quite uniform.

Subdivisions of the Upland.—As stated before, the upland would not be entire even if the valleys in which the rivers and creeks now flow were filled up, but would be crossed by belts of lowland, more or less parallel, running across the state independent of the direction of the rivers. These lowlands alternate with belts of upland surface which, by the etching out of the low-

lands, are left in relief as uplands. The second most general characteristic of the topography of Missouri, therefore, is a series of belts of lowland and upland which traverse the state in varying directions, but more or less parallel to each other. These are not stream valleys, and ridges between drainage basins and must not be mistaken for such. A proper explanation of their existence is to be found only in the geology of the state and particularly in the relation of hard to soft rocks. The rocks of Missouri, excepting an unimportant area in the southeast, consist of beds of sediment of varying degrees of hardness lying nearly horizontal. The slant of the rocks underlying the Prairie region is downward toward the northwest, and, therefore, just opposite to that of the land surface which is southeastward. The slant of the rocks of the Ozark region is downward in all directions from the top of the dome.

In the Prairie region the relation of the surface of the rocks to the land surface is such that evidently no one bed can be on the surface over the whole region. The surface, therefore, runs across the beveled edges of several beds. Each bed forms a belt of country whose width depends on the thickness of the bed and its downward slant and whose length is coextensive with the extent of the outcrop of the bed. The bed disappears on its western border by dipping beneath a higher bed, and so on across the state. Since the beds everywhere in the Prairie region slant northwestward their outcrops run northeastward and southwestward in nearly straight lines. In the Ozark region the surface likewise is across the beveled edges of several beds, but here the beds do not slant downward at all points in the same direction but slant outward from the highest point in all directions so that the outcrop of each bed is more or less circular. Now some of these beds are more resistant to decay than others and consequently the softer or less resistant beds are etched out along their outcrop into belts of lowland, and the harder beds remain for a time without much decay and uphold a belt of country left in relief as an upland. will be clearly seen, therefore, that the direction of these belts of lowland and upland will be absolutely dependent upon the direction of the outcrop of the softer and harder layers of rock. With the same dip in all the beds the relative width of the belts will depend upon the thickness of the hard and soft beds forming them.

The shape of these belts is very characteristic. The uplands on one side slope gradually down to the adjacent lowlands, but on the other side they drop off abruptly to the lowland belts. The highest point in a cross section of an upland belt is not at the midline, but at the top of the abrupt slope. The lowlands, therefore, are limited by one steep slope and one gradual one. This feature is again due to the geology. The abrupt slope of an upland is across the broken edge of a hard layer, while the gradual slope is on its upper surface and corresponds in degree of slope to the slant of the beds. The relation is the same as that made by a number of boards laid so that they overlap like the shingles on a roof. The abrupt slope corresponds to the edge of a board and the gradual one to the upper surface of a board. The abrupt slope is called an escarpment and the other the back slope.

There are several such belts of upland and lowland in Missouri, but they are not pronounced features. They have recently been traced out, mapped, named and described, and the reader is referred to that description for further details.* It is sufficient at this place to say that the hard rocks in Missouri are invariably limestones and the soft ones shales. The soft rocks are very thin in the Ozark region, so that the belts formed by their outcrop are narrow, while in the Prairie region the soft rocks include much the larger part of all the rocks. The limestones in most of the Ozark region have a large amount of chert which is so hard that it does not decompose as fast as the limestones. It is, therefore, left as loose fragments on the surface. On the uplands it is accumulated, by gradual decay of a great thickness of limestone, so abundantly that in many places it renders the soil unfit for agriculture. In the Prairie region, however, the limestone carries no chert.

The River and Creek Valleys.—In general it may be said that, within a given area of limited extent, when the upland is highest above sea level the valleys are deepest, and usually narrowest. The distance a stream flows before reaching the sea, and its size are important factors. It will be recalled that the Ozark region in Missouri is from six hundred to one thousand feet higher than the Prairie region. It was also stated that the Ozark region

^{*} Phys. Feat. of Mo. Mo. Geol. Surv. Rept., Vol. X., 1896.

is a broad, low, flat-topped dome. That being the case a stream making a uniform grade from the interior outward to the periphery will cut deeper at a point well out toward the border from the center. The streams, in general, flow radially from the top, so that the main characteristic of the region is a central area of more or less even upland with rather shallow and often wide open valleys surrounded by a rim of even upland dissected by deep narrow valleys and graduating into the surrounding lower land of the Prairie region.

The valleys of the Prairie region are prevailingly shallow, have wide flat bottoms bordered by gradually sloping bluffs. The height of the bluffs vary in accordance with the main features of the upland. When streams cross belts of upland the valleys are deeper than when they cross lowlands, but they never reach the depth of the deeper valleys of the Ozark region. The streams of the Prairie region have little slope, are consequently sluggish and the water always holds a considerable proportion of clay in suspension. water is, therefore, never clear. The channels are, with few exceptions, lined with a deposit of very fine mud often of considerable thickness which makes crossing somewhat difficult. channels wind through the wide flat valleys in extremely tortuous courses, much like, though on a smaller scale, the windings of the lower Mississippi river. The channels of the Ozark rivers, on the other hand, are everywhere gravel lined, never wind through a flat plain and the water is always clear or nearly so. streams are characterized by alternations of deep clear pools with gravel bottomed shoals.

A striking characteristic of the Ozark drainage is that small perennial streams are few. All the streams which flow throughout the year are streams of considerable size. A typical brook does not exist except during short rainy spells. This is not due to aridity of climate, but to underground drainage. Streams sink beneath the surface, often reappearing near the border of the region as large springs.

Population.—The population of Missouri, according to the last census, was, in June, 1890, 2,679,184. The whole of this population depends upon agriculture for support excepting part of that of the large cities and a small portion of the population of

a few of the other larger towns. The towns and villages of Missouri, with extremely few exceptions, are mere distributing points for agricultural districts. Their population is, therefore, to be included with the rural population.

Population and Soil.—The density of the population outside of the three large cities, St. Louis, Kansas City and St. Joseph, varies with the character and fertility of the soil.

If the state be divided up into four districts on the basis of geographic conditions we shall find the most striking illustration of the dependence of the agriculturist upon the character of the rock. The natural divisions of Missouri include the south central Ozarks, the Ozark rim, the central and northeastern belt and the northwestern corner.

The southern Ozark region includes the following counties; Crawford, Dent, Shannon, Texas, Howell, Douglass, Ozark, Dallas, Taney, Hickory, Stone, Camden, Pulaski, Miller, Oregon, Maries, Ripley, Carter, Butler, Wayne, Reynolds, Madison and Iron They include an area of 15,873 square miles, or nearly one-fourth the total area. Their population is about 245,200, or only about one-eighth of the total population, not including the population of the large cities. The density of the population is about 15½ to the square mile.

The Ozark border region includes Jasper, Newton, Barry, McDonald, Lawrence, Greene, Dade, Cedar, Polk, Laclede, St. Clair, Benton, Morgan, Moniteau, Cole, Phelps, Osage, Gasconade, Franklin, Jefferson, St. Francois, Washington, St. Genevieve, Perry, Cape Girardeau, Bollinger, Christian and Wright counties, with an area of 16,230 square miles, or about one-fourth of the whole area, and a population of about 547,147, or a little less than one-third of the total agricultural population of the state. The density of population is about 33½ to the square mile.

The central belt includes Barton, Vernon, Bates, Henry, Johnson, Lafayette, Pettis, Saline, Cooper, Carroll, Livingston, Sullivan, Putnam, Linn, Chariton, Howard, Randolph, Macon, Adair, Schuyler, Scotland, Knox, Shelby, Monroe, Audrain, Callaway, Montgomery, Warren, Lincoln, Pike, Ralls, Boone, Marion, Lewis and Clark counties, with a total area of 21,259 square miles or a little less than a third of the total area, and a popula-

tion of 769,914 or about two-fifths of the whole agricultural population. Density of population is 36½ per square mile.

The northwestern area includes Cass, Clay, Platte, Ray, Caldwell, Buchanan, Clinton, Dekalb, Andrew, Davies, Grundy, Mercer, Harrison, Gentry, Worth, Nodaway, Holt and Atchison, with a total area of 9,087 square miles or a little less than one-eighth of the whole area and a total population of about 327,843, or nearly one-fifth of the total agricultural population of the state. The density of population is about 36 per square mile.

The character of the soil in the different areas just outlined is further shown by the value of the agricultural product per square According to the last census, the value of the agricultural product in the south central Ozark region was \$460 per square mile; and in the Ozark border region \$1,277; in the central belt, \$2,000, and in the northwestern area \$3,060, in 1889. The value per unit of population shows great contrasts also. It appears from the census figures that the product in the first mentioned region, for the same year, amounted to \$30; in the second to \$40; in the third to \$55 and the fourth to \$84 per unit of population. The extremely low value in the central Ozark region is very slightly due to the fact that part of the population is engaged in manufacturing (lumbering), but this is not sufficient to modify the result greatly. The ratios of the amounts given may be taken as expressions of relative fertility of soil in the regions named. It is but just to this section of Missouri to say that these figures apply to the crops that are staples, and that while the region is not suited to this kind of product, yet recent trials have shown that the region is admirably adapted to the growth of fruit. The region, however, can not compete with the more favored sections of the state in growing the great agricultural staples. The fruit growing industry is being rapidly developed, but it had not yet reached the producing stage when the last census was taken

(To be continued.)

C. F. MARBUT.

COLUMBIA, MO.

Mexico.—The School News and Practical Educator, of Taylorville and Chicago, Ill., frequently publishes suggestive helps for geography work. In the February number is an article on Mexico, containing useful abstracts from several of the common text-books for the use of those teachers who have access to but one book. From this article the following selections are made:

Mexico, officially styled "The United States of Mexico," is a federal republic, having a president and a congress composed of two houses. It comprises twenty-eight States and one territory, that of Lower California. The president and congress are elected by the people.—Tilden.

Mexico corresponds in latitude with the Great Desert of Africa, the southern half of each being in the torrid zone.—

Monteith.

The latitude of Mexico is such as would naturally give it a very warm climate, but the country consists mainly of a plateau about a mile and a half high, which altitude gives it a cool climate. On the low, narrow, coastal plains the climate is torrid, but on the plateau it is temperate, much like ours. Its range of climate from the lowlands to the highlands enables its people to cultivate the plants of both the torrid and temperate zones. In many places one can look upward from a valley filled with torrid zone plants to a mountain tipped with never melting snow. On the highland portion the raising of cattle and horses forms an important industry. Many hides for leather come to our country from this great plateau.—Rand-McNally.

The greater part of the people of Mexico are Indians and half-breeds. Their chief food is corn cake and beans, cooked with red pepper.—*Tarbell*.

The area of Mexico is nearly twelve times that of New England. Its population is twice as great as that of New York State. About 20 per cent. of the population are whites. Of the remainder one half are Indians and one half of mixed races. Only a small portion of the mixed and Indian races can be said to be civilized.— Tilden.

Mexico lies north of the equatorial rain belt but is in the track of the trade winds. The wet season on the plateau and in the eastern coastal plain prevails in summer when the moist air from over the sea blows inland. Most of the western slope of the highland of Mexico is dry, because the winds that blow over it are warming on their way towards the heat equator. The region is too far north to be reached by the equatorial rains and too far south for the moist westerly winds.—Frye.

The rainfall is so light that from most of the basins there is no overflow to the sea, and therefore no deep canyons have been cut in these parts of the plateau. In rainy seasons water collects in the basins and forms lakes. When the rains are over the water in many of the lakes dries up.—Frye.

There are no good harbors, because there are no drowned valleys, no large river mouths. The gulf coast of Mexico is fringed with long sand bars built off shore by the waves. Vera Cruz, the chief port, is on the narrow coastal plain, and sand bars partly protect the harbor from storms.—Frye.

Mexico's great wealth has hitherto consisted in her mines of silver, gold and copper. It is estimated that the silver mines have furnished more than half the world's supply of that metal. During recent years the industry of the country has been drifting away from mining and turning to agriculture. Nearly every plant that grows between the equator and the Arctic circle can be raised in Mexico, and agricultural products of every sort would be greatly increased by a good system of irrigation.— Tilden.

Among the exports of Mexico are cattle, dye-woods, cabinet-woods, hides, animals, hemp, vanilla, coffee, and tobacco. The chief products of the soil are rice, corn, barley, wheat, and beans. The great wealth of Mexico, however, consists in minerals. There are important coal, iron, lead, copper, and petroleum areas, which have been but little developed. Gold and silver mines have long been worked and more silver is now produced than in any other country except our own.— Tarbell.

Within recent years the rearing of cattle, horses, and sheep has become a great industry in the north, and millions of dollars from the United States have here been invested.— Tilden.

The wild animals of Mexico comprise the grizzly bear, puma

or Mexican lion, and coyote. Venomous reptiles and insects are numerous. Cattle, horses, and donkeys, in vast numbers, are the principal domestic animals.—Barnes.

Within the last decade the Mexican government has encouraged by subsidies the extension of the railway system of the country, and the important towns are now connected with the City of Mexico by rail. The northward-running roads have been constructed by American capitalists. The City of Mexico is now but six days' journey from New York, and two other lines will soon connect that capital with the United States. Four railways will cross Mexico from sea to sea; and these, with their branches, will give the country a complete system and open productive areas to further development.—Tilden.

One of the most important plants of Mexico is the maguey. You may have seen it growing in greenhouses, where it is called the century plant, because it is supposed not to blossom until it is one hundred years old. Really, however, it blooms in Mexico when about ten years old. At this age it shoots up from its thick, heavy leaves, a stalk which, in about a month, grows to be nearly thirty feet high. It bears hundreds of flowers, and then dies. When the stalk bud forms, the natives cut it out and gather the sap that collects where it grew. This is sweet and, by boiling down, yields sugar. From the sap is also made a kind of drink much used by the Mexicans. The thread-like fibre of the leaves is used for making twine and ropes. Much of this fibre is brought to our country. It is an important article of commerce.—Rand-McNally.

The maguey plant furnishes an intoxicating drink, called pulque, of which the Mexicans consume a great quantity. One plant often yields 150 gallons.—Warren.

R. E. D.

Climate and Cotton Manufacturing.—It has been found that one of the important determinants of the success of cotton spinning and weaving is a humid state of the atmosphere. The more constant the degree of humidity the more profitable the spinning, especially in the finer qualities. The average spinning of England is finer than that of the United States and the average in the lat-

ter varies greatly, according to location, the finer spinning being done in New England.

Considering these facts the Weather Bureau, of the U. S. Department of Agriculture, has been examining the humidity of the southern portions of the United States, where cotton manufacturing is being largely extended at present, to see how it compares with New England. The results are published in *Bulletin No. 19*, of the Weather Bureau, price fifteen cents.

From the comparison of reports from where records of humidity have been made, it is found that Woods Hole, Mass. is more constant as regards humidity than any other station. The greatest variations are at Augusta, Ga., Wilmington, N. C. and Mobile, Ala., in order mentioned. It would thus seem as if the quality of the spinning in these places would be inferior to that of New England.

The study of humidity in other parts of the world shows that climate has hardly been considered in the localization of manufacturing towns. "To cheaper accommodations, the lower wages of workmen, the proximity to rich coal fields and the advantages of water transportation, must be ascribed the great development of the industrial arts that has made Manchester (England) famous throughout the civilized world."

"The town of Oldham, about 6 miles northeast of Manchester, at an elevation of 688 feet above the mean sea level, is one of the most important seats of cotton manufacture in the world. Its importance is largely due to the fact that it is on the edge of the Lancashire coal field, where the mineral is very easily obtained. The climate of Lancashire has no counterpart in the United States. The range of temperature is exceedingly small, the summers are cool, and there is little change from day to night. The rainfall is a little less than that of New England, but the number of rainy days is greater. The cloudiness is greater than in any portion of the United States, as is also the relative humidity." At Dacca, India, the average humidity is much lower than any part of England, and yet this place is famous for its muslins.

Though but very little importance has been consciously given to climatic control in the localization of cotton factories in the past, much more notice will be taken of this control in the future.

Either factories will be placed in localities favorable as to climate, or else artificial means will be used to insure fineness in weaving and spinning.

R. E. D.

California.—Across the State stretches, from Colorado river to the Pacific coast, a range of mountains. Its different portions bear different names, the eastern, highest portion, being known as San Bernardino; north of Los Angeles it is called Sierra Madre, while the western part is known as San Buenaventura. Its highest peak, Baldy, has an altitude of more than 12,000 feet. From this peak, near the middle of the range, the mountains diminish in height east and west, reaching the west coast with an altitude not greater than 3,000 or 4,000 feet. The Sierra Nevada and Coast ranges unite with these mountains at their southern extremities.

North of this range, near the coast, stretches the Coast ranges and the fertile valleys between them. Farther east is the San Joaquin valley, limited on the west by the Sierra Nevada. Still farther east, and forming the north base of the San Bernardino range is the Mojave desert, stretching between the Sierra and Colorado river. This approaches, perhaps, as nearly to an absolute desert as any area on the continent. It has an almost level surface, broken only by volcanic buttes and short, narrow ranges, and a soil ranging from hard, alkaline clay, to a loose, powdery consistency, and from coarse gravel to drifting sand. Its vegetation is strange, consisting of scattered bushes of various thorny species, cacti in great variety and yucca. Among these the yucca is the most prominent, standing 20 to 30 feet in height, with a straight stem and few branches, each tipped with its sheaf of bayonets.

The range has been greatly eroded by streams, so that it presents an infinite detail of canyons, gulches and spurs. Indeed, the broader features of the range are almost concealed in the infinite variety of detail. The great multiplication of details seems to be a result of want of forest cover to the range. Timbered mountains are commonly eroded into large, broad features, while bare mountains are eroded, as are these into fine details.

The stream canyons and gulches are short, with steep slopes to

the edge of the valley. Few of them carry water except in the winter, the rainy season, and then, for a time, they carry large volumes.

South of this range lies a valley sloping gently southward. Its western part is limited on the south by the Pacific ocean, its eastern part by the San Jacinto mountains. This valley is the garden of southern California. Near its western end is Los Angeles, near its eastern end San Bernardino, while between the two cities are numerous beautiful little towns, strung along the Southern Pacific and the Atchinson, Topeka and Santa Fe railroads. For fifty miles it is almost a continuous city, the towns being connected by orange orchards, vineyards and truck farms.

The climate of this valley is arid. Little rain falls upon it, and that little in the winter. The soil, however, is extremely fertile, and when irrigated becomes a veritable garden, while without irrigation it is a desert. Thus, one sees in close juxtaposition the widest contrasts; on one side of the road an almost tropical luxuriance of vegetation, on the other cacti and sterility.

This valley commences on the north with a somewhat steep southward slope, which gradually becomes more gentle, and finally rises a little as the base of the San Jacinto mountain is neared. Its northern slopes present very interesting and significant details. An examination of it on the ground, or on a good map, shows that at the mouth of every canyon issuing from the mountains the land is higher than it is elsewhere, the form of the elevation being that of a part of a cone, with the apex at the canyon's mouth and spreading southward. Upon this cone is commonly found the stream bed, most of the year a dry bed of sand. It may be found on the highest line of the cone on upon the side. It may be a single stream bed, but more commonly it is divided downward, as is the case with the lower Mississippi, and these bifurcations may unite, forming in some cases an intricate network of stream beds upon the cone. In some cases the stream bed is found on one side of the cone, as though it had slid off from its position of unstable equilibrium.

The succession of "alluvial cones," as they are called, is the most interesting topographic feature of the valley. These cones are being formed by deposition of detritus—sand, gravel and soil

brought down from the mountains by the stream when in flood. These streams, as was above stated, have steep courses in the mountains, and consequently flow with great velocity. On reaching the margin of the valley this velocity is suddenly checked, and, consequently, a large part of the detritus is dropped in the stream bed and on the banks. Having thus built up its bed above the neighboring country, the stream, having an unstable course, leaves it to take up a neighboring position. This bed in turn is built up and the stream abandons it for a new one.

In this way the stream builds up its alluvial cone, raising it when it flows upon its surface, widening it when flowing along its margin. The coarser detritus is, of course, dropped first, and is found at or near the mouth of the canyon, while the fine material is carried far down into the valley. At the mouth of the canyon are found great boulders weighing hundreds of pounds, which attest the enormous power of these streams when in flood.

Near the mountains these doposits of sand and gravel are of enormous thickness, and they form a great storehouse of water. In the wet season they are saturated from the streams, and they give up the water to the hundreds of artesian wells which have been bored in this valley. Indeed, the water supply for a large part of the irrigation of this valley is derived from these wells.—Bull. Am. Geog. Soc., XXVIII., 4, 1896.

Prizes for School Work on Weather and Climate. Instruction in meteorology in our schools is at present in a rather unsatisfactory condition, owing partly to the lack of a text-book adapted for school use, and partly to the fact that many teachers have no very definite ideas regarding the use that can be made by the children of knowledge they may gain through such instructions. Anything that helps to systematize and give definite shape to such teaching is therefore to be welcomed. It is to be noted that a very definite step is this direction has been taken in New England. On the dissolution of the New England Meteorological Society, in 1896, a sum of about one hundred dollars was left in the hands of a committee, to be used "for some meteorological purpose," and the purpose to which it has been decided to devote the money is to give prizes for work on weather and climate done in any New England

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public school below the high school. A circular recently issued by the committee states that there will be three annual prizes, of twelve, ten and eight dollars.

NOTES.

"The prizes will be awarded by judges, to be selected at a later date. Each competing school may submit the work of three pupils, selected by the teacher from the work of a single class. papers and record books sent are to be wholly the work of the pupils whose names they bear; all records are to be the result of the pupils' own observation; the papers received will be taken to represent the best products of work done by an entire class—that is, all members of the class are to do work similar to that of the three pupils whose papers are forwarded to the committee. the work of each pupil a paper should be sent stating the (1) name of pupil; (2) age, in years and months; (3) name of school and grade or class (counting first year in school as first grade, second year, second grade, etc.); (4) name of teacher; (5) town or city, and state. The committee does not desire to limit the work closely or to require uniformity. The work may be done as special study in weather and climate, or it may be part of a course in nature study or in geography. But the committee suggests the following topics as appropriate:

- "(1) Observation and record of simple weather elements.
- "(2) Preparation of weather maps based on data supplied by the teacher.
- "(3) The use of weather maps and of local observations in simple weather predictions.
- "(4) Special observations and study of the elements that control the climate of New England.
- "The judges will make due allowance for the age of pupils and their school grade, and will award the prizes on the basis of quality of work in whatever subject the teacher may choose, bearing directly on weather and climate. Owing to the late date at which this circular is issued, work covering only the second half of the school year, 1896—'97, will be accepted in the first competition.

"The papers submitted should be received in Cambridge by July 10, 1897. Address:—Prof. W. M. Davis, Museum, Cambridge, Mass. Express charges or postage should be fully pre-

paid. If it is desired to have the papers returned, full directions should be given for postoffice or express address; and if return by mail is desired, stamps for postage should be enclosed."

R. DEC. W.

EDITORIALS.

The editors take pleasure in presenting this month two papers, somewhat different from any that have thus far been offered. The first, by Professor MacMillan, is a study of plant distribution, in which the author illustrates, in a small locality, the general laws controling the geographic distribution of plants. The paper should be read with this idea as a guide, and each illustration should bring to mind larger features in the world, in which the same laws have similar but greater results. As a hint for the study of local flora, the paper is somewhat too botanical for this Journal, but as a study of the underlying controls of plant distribution, applied to a small locality, and yet illustrative of all localities, the paper is full of suggestions to the teacher of geography.

THE paper on Missouri inaugurates a new departure in this JOURNAL; that of continued papers. The editors have in mind a series of papers taking up in detail the geographic features of the several States, each paper being written by a geographer who has made a special study of the State described.

The object of extending the papers over more than one issue is not to allow increased wordiness, but more numerous ideas. Our aim always will be to give principles and details in a concise, clear and readable manner.

THE editors have to express their thanks to the many educators and geographers who have given the JOURNAL so hearty a welcome and such good wishes. We have had many congratulatory letters from all parts of the country, but we have not had as many suggestions as we would like. The responsible editor would be glad to receive suggestions as to possible improvements, as to the kind of contributions that would be most helpful, and as to writers in different parts of the country. In fact, any suggestions as to ways to improve and enlarge the value of the JOURNAL would be most welcome.

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We have received many suggestions that the JOURNAL would be better were it larger and illustrated. The undertaking at present is a large one, and the success of the JOURNAL depends upon the reception it receives. Contributors and editors are giving their energy and time with no thought of money return. As soon as the number of subscribers warrants the increased cost of printing, the JOURNAL will be enlarged to twice its present size, with a probable fifty per cent. rise in cost, and will be illustrated by maps, photos, diagrams, etc.

It is to be hoped that these improvements can begin with Vol. II., but they will be incorporated at the earliest date that the conditions will allow. To those friends who wish "that there were more of it" we say that we will do our best to accommodate them at our earliest opportunity, and that they can hasten the improvements contemplated by sending us many subscriptions.

REVIEWS.

Elementary Meteorology for High Schools and Colleges. By FRANK WALDO, Ph. D. New York, Cincinnati and Chicago. The American Book Company. 1896. 8vo. Pp. 372.

The book before us is the newest text-book of meteorology. Its author has had thorough training in the science, and does not lack experience as a teacher. It presents the subject in the light of the most recent discoveries and researches. It is of convenient size, and published at a moderate price. Its illustrations are numerous and most of them good. With these points in its favor it is a pity that it should have one great drawback. suited for ordinary school use. The author has attempted to give us too much, and in so doing has necessarily been obliged to hurry over many matters with insufficient explanation. This very condensed, or, if we may use the expression, this "highly concentrated" presentation of the subject, is out of place in a text-book intended for schools. The teacher and the scholars are overburdened with the multitude of different matters touched upon, and a simple, systematic, elementary course in meteorology, such as schools require, can only be developed out of so extended a work with some difficulty.

The book is very accurately and carefully written. It presents some of the more complicated matters, e. g., the general circulation of the atmosphere, in as simple language as is possible. Apart from its non-elementary character, and a certain lack of continuity and correlation of the several sub-divisions of the subject, it is a very good book.

R. DEC. W.

State Map of New York as an Aid to the Study of Geography.

By WILLIAM MORRIS DAVIS. Examination Bulletin No.
11, University of the State of New York. 1896. Price,
5 cents.

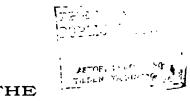
The pamphlet whose title appears above ought to be of much help to the teachers of New York State, and we commend it heartily. It is not expected that any teacher can apply all that is contained therein to her classes at once, but any teacher will find much that is new, and principles as well as facts that will be suggestive.

Every teacher, who believes that the features of the home region are the ones with which to begin descriptive geography, will find this pamphlet of great value. Those who disbelieve in the study of home geography should read this paper and be convinced of the error of their belief.

The pamphlet opens with an account of the geographic map now being slowly issued by the State and the U. S. Geological Survey. Then follow paragraphs describing the areal features of the State; then classification and something of their origin. The following is the order of their treatment: Mountains, highlands and uplands; ridges, plateaus and uplands; escarpments; hills; lowlands and plains; valleys; forms of glacial origin; flood plains; terraces; estuarine plains; delta plains; swamps, marshes and lacustrine plains; brooks and rivers; divides; ponds and lakes; rapids and falls; chasms, glens and gorges; features of lake and sea coast. Then follow paragraphs on the relations of these features according to origin; the relations of surface features to man and some suggestions regarding the apportionment of map work to the different years of the school course.

The pamphlet deserves a hearty welcome and should surely be secured by all schools, as a reference book for the teachers of all grades.

R. E. D.



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THE HYDROGRAPHY OF THE UNITED STATES.

In order to obtain complete information as to our country and its possibilities, such that our people may utilize and enjoy to the utmost the advantages with which they are surrounded and develop the resources in the fullest possible manner, it is necessary, among other requirements, to become thoroughly acquainted with facts as to the quantity and distribution of the waters in springs, streams and lakes. Together with sunlight, earth and air, water stands as one of the prime requisites of life. Without it living beings, plant or animal, are impossible. It is not, however, with water in this primary function with which we are now concerned, but rather with what might be termed its geographical aspect. For example, the traveler coming to a new country first seeks drinking water for himself and his animals and sends back word as to its location, quantity and character. The settler in the choice of a spot for his home is controlled by the accessibility of springs or streams and the early means of communication, the roads from settlement to settlement, are thus fixed by the same determining cause. The manufacturing interests grow up where the water has volume and fall sufficient to furnish power; navigation develops along the streams and lakes, and commerce is influenced

by the depth and ease of approach to harbors. The sanitary condition of the population of the country and town is dependent largely upon the quality and quantity of water supply. In short, health, employment and prosperity in all communities rest more or less directly upon the existence of water.

If we should bring together all the facts above enumerated concerning the amount of water in various localities, noting the fluctuations which take place from time to time, we should have a body of knowledge which is included under the term hydrography. A narrower meaning has sometimes been attached to the word hydrography, limiting it to a description of navigable waters and to the art and science of making charts of the coasts and larger waterways. In the present discussion, however, the word is used in the broader sense as being applicable to the description of inland waters as well, even though these occur in quantities only sufficiently great for domestic use.

Having obtained a thorough knowledge of the occurrence of water in various parts of the country the characteristic American at once asks himself how this knowledge can be turned to utilitarian ends or, as he is fond of saying, to "practical results." Having learned that water is deficient, as regards the needs of agriculture, in certain localities, he asks how can this deficiency be supplied, and at once brings up the whole matter of irrigation. Learning there is an excess in other places and that valuable lands are marshy and malarious, the query is how to get rid of the excess, and matters pertaining to drainage are discussed. Knowing that underground there exist considerable quantities of water, some of it under pressure such that it would rise to the surface, the thoughts are at once turned to the cost and methods of drilling or digging wells. Finding that cities and towns are hampered in their growth by impure water supply, inquiry is set on foot as to how better sources may be obtained, reservoirs constructed and Thus we have what might be called an industrial conduits laid. hydrography—one which, based upon thorough knowledge, is able to minister to the many needs of civilized man.

The circulation of the waters of the earth may be performed through longer or shorter paths; the ocean spray may be caught up, held as vapor for a short time, deposited upon the cold rocks near the ocean, and rolled back as a tiny rill; or it may be carried inland, sink into the pervious soil, caught by the roots of a plant, transpired through the leaves, or possibly the leaves eaten by some animal and the water exhaled to return to the air and be again deposited as dew upon the ground, moistening the soil, adding to the volume of a spring, or sinking deep beneath the surface it travels in the course of years many miles, or even hundreds of miles, through deeply buried sandstones, reappearing in an artesian well to be thrown high in the air by the pressure due to accumulated water particles in its rear. The history of any one drop of water might be made to fill a volume, so numerous and varied are its functions upon and under the earth.

The general distribution of the rivers and lakes of the United States is best exhibited upon a general map which is not obscured by political divisions. The branching lines show by their position the location of the higher ground and the mountain masses. carefully following along the tips of the finer branches or twigs of the tree-like river systems, we note the main divides which separate one great valley or lowland from another. The largest and most conspicuous of the great drainage systems is that taking water from the broad valleys, prairies and plains stretching from the Allegheny to the Rocky Mountains, the Mississippi, receiving branches from both sides and stretching its long limb, the Missouri, far to the northwest, reaching even into the British possessions. On the east of the Appalachians the rivers run with comparatively short, direct courses to the sea. From the Rocky Mountains radiate southerly the head waters of the Rio Grande and great Colorado, and northwesterly the torrential streams which make up the Columbia. Between these lies the great weird interior basin, a land of deserts and bare mountains, a country from which no river escapes to the sea, but flowing in tumultuous torrents and high cascades from lofty mountains, the waters issuing through deep gorges gradually disappear and are lost in the wide, parched On the far west are the many streams which, flowing vallevs. from the Sierra Nevada, unite in the two great longitudinal rivers, the one from the south, the San Joaquin, meeting that from the north, the Sacramento, and, turning sharply to the west, pour their mingled floods out through the Golden Gate.

In looking at such a map of the rivers the natural inference is that the volume and consequent importance of a river is proportional to its length. In other words that the long, far-reaching Missouri is a larger stream than the comparatively short Ohio. But such is not the case. Many of the rivers, which from the map seem insignificant, carry far greater volumes of water than those which stretch across long distances. The Rio Grande, for example, where it begins to form the international boundary is often dry, while some of the rivers of the Atlantic coast, scarcely to be seen upon a small map, discharge volumes which, could they be emptied into the Rio Grande in New Mexico, would add untold millions to the wealth of that Territory. This relative size of the river is not then one of length or consequent area drained, nor is it dependent directly upon the amount of rainfall, but rather upon the amount of water which runs off the ground. The latter quantity is not directly proportional to the precipitation, for it has been found that with heavy rains a considerable percentage goes to form the streams, while in the case of light rains nearly all the water may be returned to the air by evaporation without appearing even in rivulets. Thus a map of the amount of water which ultimately finds its way into the streams, while, in general, similar to that of the rainfall, differs from it in essential particulars. This general runoff map * has been colored to represent in a broad way the depth to which the water would cover the surface if all that had flowed during the year should be put back upon it. example, in the eastern and southeastern part of the United States the rivers discharge an amount equal to a depth of 20 inches, or more, over the entire surface, while north and west of this in the upper Mississippi Valley the quantity is less, decreasing westerly until the Great Plains are reached, from which little if any water runs from the surface. Further west within the great Interior Basin the runoff, except from the higher mountains, is practically nothing; while on the far western coast with its steep mountains and heavy rainfall the runoff approaches to that of the Appalachian region of the east. The topography of the regions of high runoff is well illustrated by views of the high mountains, while in

^{*}Printed as plate V. of the Fourteenth Annual Report of the U. S. Geological Survey, part II., p. 150.

striking contrast to these are the broad areas of the Great Plains where the ground is so nearly level that the water, hesitating which way to flow, finally sinks into the soil or collects in little pools and is wasted by evaporation. Such country is well illustrated by the plains of western Kansas unscarred by rivulets, the scanty rainfall being rapidly drunk up by the thirsty air.

F. H. NEWELL.

HYDROGRAPHER, U. S. GEOLOGICAL SURVEY, Washington, D. C.

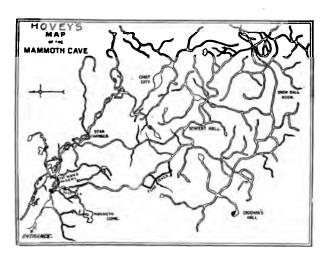
MAMMOTH CAVE, ITS ENVIRONS AND CONTENTS.

Great caverns are mostly found in limestone regions, especially in the undisturbed and homogeneous rocks of the Ohio valley. is estimated that this cavernous area covers more than 8,000 square miles, and that its subterranean passage-ways, if placed endto-end, would make a tunnel long enough to go four times around the globe. The region thus honeycombed includes parts of Indiana, Tennessee and Kentucky, but most of it is in the latter State. Imagine a vast level plain slowly lifted by geologic forces, being meanwhile grooved, carved and excavated by the chemical and mechanical action of water, and you will get an idea of the country traversed by the Louisville and Nashville railway. The scenery is an agreeable diversity of "knobs" and "sink holes;" the former being pyramidal hills left by erosion, and some of them several hundred feet high, while the latter are oval depressions, or valleys, with no inlet or outlet, except through crevices or pits communicating with underlying chasms or caverns. The region thus under-drained is known as the Kentucky Barrens, not because it is really "barren," but because there are no running streams aside from one or two of large size that are fed by subter-Green river is a splendid example of cavern-fed ranean fountains. streams, having no open-air tributaries, yet being navigable for steamboats during high water, and never freezing even in the coldest winter. In the heart of this remarkable region Mammoth Cave is located, being the noblest specimen of the hundreds of known caverns found in Edmondson county.

The bluffs of Green river are gashed by many rifts and arches whence issue rills that flow from various caverns. Could we enter thus we might climb through a series of galleries and emerge at last in one of the oval valleys described as sink holes; or the process might be reversed. But more usually the available entrance is at some place where the cavern roofs have fallen in, whose fragments are our stepping stones, down into realms of perpetual Such a break is the present mouth of the Mammoth It is 194 feet above the level of Green river, from which it is distant about half a mile; and it is 735 feet above the sea-On the bluff above it stands the Mammoth Cave hotel, which is reached by a short railroad from Glasgow Junction. telligent and trustworthy guides are in waiting, who supply whatever outfit the tourist may need, for a trip into the cave. convenience two principal routes are marked out, though special trips can be arranged for by those having time and inclination to take them.

The approach to the cave is through the hotel garden, down a rough pathway winding amid tall sycamores, majestic oaks, and other forest trees, clad with gigantic grapevines, and hoary with No sign of the immense cavern appears till variegated mosses. you cross a country wagon road and step into an opening in the forest, where suddenly the gulf yawns at your very feet. cate ferns, liverworts and trailing vines adorn this rift in the rocks. A mysterious cascade gleams in the sunlight, flashes down the gulf, and vanishes instantly amid the rocks below. this wild waterfall winds a flight of stone steps, by following which we begin our underground journey. Few do so without a sensation of awe and a certain shrinking from the darkness whose only relief is this one entrance where we bid farewell to the daylight and trim our lamps for the underground excursion. It is not always easy to carry a lighted lamp into this dark gateway; for usually a volume of cool air wells up from it and flows down the valley. The uniform temperature of the interior is, on an average, 54 degrees Fahr., winter and summer. The gale dies down as we proceed, and disappears shortly after we pass through an iron gate set in the narrows leading to the Rotunda. Here we find the remains of the saltpetre works from which the government obtained

one of the ingredients of gunpowder used in the War of 1812. Many thousands of pounds were manufactured from the nitrous earth abounding here, and were carried on pack-mules and wagons to Philadelphia. To the miners we are indebted for the early explorations, which were afterwards extended in the interest of discovery and for the purpose of exhibition.



The Main Cave runs from the Rotunda to the Cataracts, and then the name is given also to a continuation on another level to what is styled Ultima Thule. It is like a great trunk from which the minor avenues branch; and it must be followed for some distance whatever route the visitor takes. On the right Audubon Avenue opens from the Rotunda, leading to Olive's Bower, the mushroom beds and the Crevice Pit, an ugly hole whence by a rope one might be lowered into the Egyptian Temple and the Mammoth Dome. Advancing in the Main Cave we find a worn cart-road for some distance, and the vats, pumps and pipes, and the heaps of lixiviated earth left by the old miners, and the chapel where they used to worship. The average dimensions of the passage-way is about sixty feet in width and forty feet in height, with frequent enlargments and occasional contractions. evidently the channel of an ancient river, which here and there parted and reunited, forming islands, which are now so many pillars supporting the ponderous roof. On our left is the opening

to a singular filled-up pit called the Corkscrew, down which we might scramble to River Hall. On our right we come to the Gothic Avenue, with its dry, dusty floor, its aged stalagmites, its Bridal Altar where many a runaway couple has been wed, and many grotesque formations resembling elephants' heads, armchairs and other fantastic objects. Presently we come to the Giant's Coffin, a huge detached rock, 40 feet long, 20 wide and ten or more high. Incrustations of gypsum stained by the black oxide of manganese mottle the ceiling, like clouds, and occasionally take unique shapes called by fanciful names. Ruins of stone cottages are pointed out where consumptives dwelt, many years agohoping to regain lost health in the chemically and optically pure atmosphere and uniform temperature. Then we come to the Star Chamber, whose canopy is intense black, spangled by snowy gypsum stars, an illusion skillfully exaggerated with realistic effect by devices of the guides. As we pass along through Proctor's Arcade and Kinney's Arena, the ascending column of hot air from our lamps and the shouts of the guides bring down a myriad flakes of Glauber salts in a mimic snow storm. We pass tumultuous assemblages of fallen rocks, called "cities," of which there are five in all. The Chief City is overarched by a dome 450 feet long, 175 feet wide, 125 feet high, and covering an area of nearly two acres with a single canopy of limestone without seam or flaw. The absolute stillness of the place is appalling, as the writer found when left alone there at midnight last summer; and when, as an experiment, he extinguished his solitary lamp, the silence and darkness were insupportable. Waldach's and Hains' domes lie beyond the Chief The entire length of the Main Cave is about three miles, not counting side avenues, and it is interesting for its Indian relics, as well as its scenery.

The region of pits and domes is reached by a narrow gateway behind the Giant's Coffin. There are five distinct tiers in Mammoth Cave, which these vertical shafts pierce from top to bottom. The old theory that they were made by whirling water loaded with pebbles is erroneous. They were made almost wholly by the solution of the oölitic limestone along its lines of weakness. The facts were closely studied by the writer, in company with Dr. R. E. Call, and we also measured accurately all the more important pits.

Gorin's Dome is the grandest of all, though hardly surpassing the Mammoth Dome. Scylla, Charybdis, the Bottomless Pit, and the Maelstrom are all of about the same depth, exceeding 100 feet. To the depth of the pits should be added the height of the domes above them; the domes and pits really being identical. Probably the greatest vertical shaft does not exceed 150 feet. The majesty and beauty of these lofty openings can hardly be exaggerated.

The lowest level is about 250 feet below the entrance to the cave, and here is the gathering bed of the waters, which descend through the surface sink holes and the interior pits. The River Region is reached in three ways; by the Corkscrew, by Fat Man's Misery, and by Ganter Avenue. The latter is an extremely narrow and tortuous tunnel, 8,500 feet long, beginning near the Giant's Coffin, and coming out beyond the rivers. The usual path is through the Fat Man's Misery, so annoying to portly people, but which is only 236 feet long and opens this side the waters. Many who go in one way come out another for variety.

River Hall extends for many miles, if we consider the ramifications of the subterranean streams. In the rainy season we have seen all the streams united in one body of water fully eighty feet deep, and sweeping along with a strong but silent current. Ordinarily there are several large pools, or rivers, called the Dead Sea, Lake Lethe, Echo River, Roaring River, Mystic River, etc. The largest, and by far the most interesting, is the Echo River, which is from half to three-quarters of a mile long and is famous for its remarkable reverberations of sound. There are three landing places where visitors embark on rude flat-boats. vault has a key-note of its own which, when firmly struck, excites harmonics of incredible depth and sweetness. Those who try their voices find them prolonged for some time after the impulse. When the guide violently agitates the water, it seems as if a concert of bell-ringers had begun, followed by the chimes of cathedral bells, after which come whimsical cries and ghostly mutterings, the whole performance lasting for half an hour if well managed.

Silliman Avenue, Serpent Hall, Rhoda's Arcade, El Ghor and numerous other passages and chambers have their attractions. But the most wonderful of all are those found amid the crystalline conservatories of Cleveland's Cabinet, Paradise and Portia's Parterre. Here we find a very treasure-house of alabaster gems. Imagine symmetrical arches of fifty feet span, where the fancy is at once enlivened and bewildered by a mimicry of every flower that grows. These cave flowers are in reality curved crystals of gypsum, known to the mineralogist as oulopholites.

About five miles from the entrance the cave ends in Croghan's Hall, named for a former owner. The pit called the Maelstrom is here, and those who have dared to descend it say that avenues open out from its bottom. Mammoth Cave is, in fact, not one cavern, but a congeries of caves and grottos, whose walls and floors have been worn away by aqueous agencies. Hence it is impossible to tell where this congeries ends; for the next blow of the hammer might open into some vast hall or long avenue. The usual estimate is that if all known passage-ways were placed end to end they would form a tunnel 150 miles long; but, of course, this is conjectural.

Plant life in caverns is seriously affected by the constantly cool temperature (54° Fahr.), and by the utter absence of light. Many forms are microscopic and all are cryptogams. They have been brought in by the floods, or on timbers used for various wooden structures, or in connection with the lunches spread for thousands of visitors. Natural mushroom beds were found by the writer in River Hall, which suggested the costly experiment of artificial beds in Audubon Avenue, which might be made successful by proper methods. Masses of mould, *Mucor mucedo*, hang from the bottom of bridges, as in mines, waving in snowy, feathery festoons of great beauty.

Myriads of bats hibernate in Mammoth Cave. Rats, mice, lizards and a few other strays from the outside world can hardly be classed as true cave-dwellers, although somewhat modified by their subterranean environment. The writer has enumerated only ninety-three species of true cavern fauna: Infusoria, 9; Vermes, 4; Crustacea, 11; Arachnida, 31; Myriopoda, 5; Insecta, 33; and Vertebrata, 4. Most of these animals are small and shy, darting into crevices or hiding under stones when disturbed. None are known to be poisonous. The majority are scavengers, feeding on the refuse left by human visitors, or on decomposing bodies of their comrades, or on the vegetable debris swept in by the streams.

All kinds of fauna and flora suffer from deterioration here. The plants are bleached. Spiders, flies and centipedes are a pale brown or white. The eyeless fish are translucent. Some of the sightless animals, however, show signs of a progressive adaptation to their peculiar surroundings. They also enjoy compensation for the atrophy of their organs of vision, in the increased sensitiveness of their other organs and in the remarkable elongation of their hair, limbs and antennæ. It should be stated that quite recent investigations by naturalists have added to the catalogue of cavern fauna and flora.

The bibliography of Mammoth Cave is extensive; more than 400 titles being listed of volumes, scientific reports, magazine articles, etc. The writer may be permitted to refer to his own work on "Celebrated American Caverns," from the press of Robert Clarke and Company, Cincinnati; and to a new Illustrated Manual of Mammoth Cave, the composite work of the writer and Dr. R. Ellsworth Call, which will be published this season by the J. P. Morton Company, of Louisville, Kentucky, and which is intended to include all important facts up to date.

HORACE C. HOVEY, D.D.

NEWBURYPORT, MASS.

THE TEMPERATE ZONES.

We are generally accustomed from early years to define and regard the two temperate zones as if they were essentially alike in climate. In reality, however, there is a remarkable diversity of climate in these two belts, in view of which it is thought desirable to emphasize their dissimilarity almost as soon as their few elements of likeness are announced.

The two temperate zones are symmetrical in their latitude boundaries. They are almost alike in the distribution of the sunshine that falls upon them; but in this respect they are not identical. The period from the vernal to the autumnal equinox is longer by several days than that from the autumnal to the vernal equinox; hence the northern summer is longer than the southern summer. But during the northern summer, the earth is

farther from the sun than during the southern summer, hence the longer lasting sunshine of the northern summer is less intense, day by day, than the shorter lasting sunshine of the southern summer. If there were nothing to counteract these influences, the northern summer would be the longer and milder, and the southern summer would be the shorter and hotter. The winters would differ in an opposite fashion. But, as a matter of fact, these astronomical influences are, in the first place, relatively weak; and, in the second place, they are altogether over balanced by terrestrial influences, so that the actual climates of the two temperate zones are by no means what might be anticipated from their astronomical relations.

When the dependence of climate on latitude was first perceived by the Greeks it was argued out as a deductive consequence of the action of the sun's rays on a rotating sphere. It was not at that time understood that a large control of climate is in the hands of the materials of the earth's surface, as well as in the intensity of the sun's rays, and hence that geographical as well as astronomical relations are important in this regard. Indeed, even when New England was settled great surprise was expressed at the strong unlikeness of its climate to that of similar latitudes in Europe. To-day it is something of a truism to say that belts of heat depart from latitude lines; yet there is still a strong tendency to class the two temperate zones together, even if their boundaries are drawn along isotherms instead of along parallels. If the facts of the case had been known when the names of the zones were invented, it is not at all likely that so inappropriate a term as temperate would have been applied to the north-middle zone, although it might be used for the south-middle. Torrid and frigid are good enough; temperate may serve for the chilly belt of the southern hemisphere, but intemperate would be much more fitting-were it not for another particular meaning that has come to be attached to that word—for the composite climate of the north-middle belt.

The south temperate zone is very largely an oceanic zone, and as such it has a relatively steady or well-tempered climate, neither hot nor cold. The north temperate zone, on the other hand, is a land-and-water zone, and as such it is, in the first place, very unlike in different parts, and in the second place a large part of it has a climate of great annual variations. It is hardly too much to say

that during the winter season the climate contrasts encountered in running around the world on north latitude 50° are as great as those encountered in following a meridian from pole to pole.

The cause of all this is well understood. It depends on the different specific heats of land and water; on the immobility of the land surface in contrast to the mobility of ocean surface in waves and currents; and to a less degree on the action of the winds in their attempt to blend the differences that would otherwise prevail on lands and waters. But it is not my purpose to consider the question of causes at present. The facts alone will suffice.

The great oceanic area of the south temperate zone is characterized by prevailingly moderate temperature, prevailingly stormy winds, generally from the west, but often shifting to north and south, with frequent cloudiness and rainfall (including snow under this general term). Seasonal variations in these elements are very small. The range of temperature between the mean of a winter month and the mean of a summer month is only five or ten degrees Fahrenheit for a large part of the zone, greater ranges being limited chiefly to a few land areas and their neighborhood. The changes of weather, themselves not excessive, are often greater than the changes of season; but the winter has stronger, more stormy winds and probably heavier precipitation than the summer. As the ocean surface is very uniform, so is the climate that it controls. A single sample of the southern temperate zone may fairly suffice for the whole.

The continents of the southern temperate zone are of small extent. The islands which interrupt the great southern oceanic belt are singularly inhospitable; not that their winters are exceptionally cold, for they know nothing of the extremely low temperatures of northern continental interiors; but that their chilling summers are so little milder than their winters. They have no mild season in which provision may be made for the rest of the year, and the reason for this is simply that they are too small and too few. The uninhabitable island of South Georgia, with glaciers descending into the sea, is often unfavorably compared with middle England, one of the gardens of the earth, the two places being symmetrical in latitude measure. The implication is sometimes permitted that South Georgia is the abnormal one of the two examples, and

England the normal; but the very reverse is true. South Georgia is a fair specimen of what one would find in its latitude all around the south temperate zone, and England is decidedly an exception.

The north temperate zone is the zone of seasonal variations. Charts of mean annual temperature are here of little significance, for the actual temperatures of the year reside longer near the mean temperature of the hot or cold months than near the mean annual temperature. The year is made up of a warm and a cold season, separated by periods of rapid warming and cooling. The upper winds are prevailingly westerly; but the surface winds are variable in strength and direction, particularly on the lands. On the waters of the Atlantic and the Pacific there is a resemblance to the south temperate climate; but on the broad lands there are climates that have no parallel in the southern hemisphere.

The southern parts of the north temperate continental interiors attain truly torrid heats in their summer season. and Persia rival the Sahara in having mean temperatures for July above 90 degrees. In the southern temperate zone, there is no such temperature at any time of year. The more northern continental interiors have warm summers, with a July mean near 60 degrees; but they are extremely cold in winter. In the overgrown continent of Asia, the "cold pole" of winter has a mean January temperature of 60 degrees below zero. Such an extreme is altogether impossible in the southern temperate zone. With these strong changes of seasons, there is associated a strong variation of weather during the successive seasons. This is particularly well exhibited in our continental interior, about Minnesota and Winnipeg. Summer heat may be excessive for a few days, then giving way to a refreshing northwest wind. Winter cold of very low degree may yield to mild winds from the south. Change, day by day, and season by season, is here as distinctly the rule as uniformity is in the southern hemisphere.

Furthermore, the element of change does not prevail only with respect to time, but equally with respect to place. There is no single locality that furnishes a fair sample of the north temperate climate; for the climate is a crazy quilt of patches; not of uniform texture throughout, as in the south temperate zone. The latitude line of 50 degrees, N., traverses in summer or winter,

regions so unlike in climate that it is distinctly misleading to include them all under a word so unfitting as "temperate," thus implying that they have a likeness all around the zone, and that they resemble in any close way the southern zone of the same name. ginning on the relatively equable climate of the middle North Atlautic, let us pass around the world eastward. We enter western Europe, where a favorable climate has witnessed, in the history of the last thousand years, the greatest progress that mankind has We then cross the broad desert of western and central Asia, where the uninterrupted extent of too much land, far from the seas, determines violent changes of seasons and persistent aridity The people here are few in number and are through the year. held back in barbarism by unsurmountable natural difficulties, chiefly climatic, that bar the way to civilization. Emerging on the Pacific coast, there is a narrow strip of the continent with some bordering islands, where the climate is subtemperate; but it varies strongly under the cold land winds of winter, and the milder sea winds of summer. The North Pacific itself is more equable than the North Atlantic, on account of its greater area; here, as in the southern hemisphere, the climate is truly temperate. Reaching North America, the penetration of the tempering influences of the Pacific is impeded by mountains; and the interior is characterized by the severe continental climate of the Saskatchewan district. The sparsely settled region between the Great Lakes and Hudson Bay, and eastward into Labrador, opposite to England, is one of the unhappy deserts of the earth, as far as civilization and all prospect of civilization is concerned; not altogether on account of severe climate, but certainly the climate there cannot be advertised as an attraction by which the various other disadvantages are compensated.

The upshot of all this is that, at a very early stage of teaching, the two temperate zones should be contrasted as unlike, instead of being set forth, by direct statement or by tacit implication, as alike. It is not probable or desirable that their firmly established common name will be put aside at this late date; but the unattractive uniformity of one, and the remarkable diversity, good and bad, of the other, should early be implanted in the minds of our pupils.

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W. M. Davis.

MISSOURI.

(Continued from page 117.)

Towns and Villages.—It has already been stated that the town and villages in Missouri are distributing points for agricultural communities. The only exceptions to this are the very few villages supported by mining industries and a few lumber towns. There is not a village in Missouri whose inhabitants derive their support entirely or even in large part from manufacturing industries. The location of the villages was determined by the location of a large body of good farming land. Where, as in the Prairie region, practically all the land is capable of producing good crops, the location became merely accidental or else had some relation to transportation facilities. Before the advent of the railway the wagon roads, the only routes of travel excepting the rivers, ran at will over the prairies. The location of a road was determined by chance, by the homestead of some pioneer or by an Indian trail. The earlier settlements were located along the larger streams and the roads usually took the shortest route between them, being free of natural obstructions.

The most important factors determining the location of the settlements along the streams in northern Missouri, were the abundance of water and timber. Along with this there was a prevailing idea among the early settlers that the upland prairie soils were not fertile. The settlers had come from a wooded country. They brought their experience, gained in the Appalachian region, with them and acted accordingly. If timber and water had been as easily available on the prairie uplands as in the valleys, there is but little reason to think that they would have been settled along with the valleys. The fertility of the soil would have soon been discovered. But the settlers had come from a land of surface streams and had not learned the art of water storage, nor had the coal deposits of the state yet become available for fuel. Timber was needed for fencing as well as for fuel. Live stock roamed at will over the unoccupied land so that a strong fence was a necessity. Wire fencing was unknown and hedges required several years to become heavy enough to turn stock.

In southern Missouri the uplands, as well as the valleys, were forest-covered, but in this part of the state the upland soils are really very much less fertile than the valley soils. The problem of water supply was the same here as in northern Missouri.

The largest towns and villages were, of course, located along the trunk line of navigation, the Missouri river. In addition to being located on the river, another factor comes in here that does not obtain to a great extent elsewhere. The Missouri river flows through a flat, alluvial plain, several miles in width, which, during extremely wet weather and high water stages in the river, is very difficult to traverse on account of the mud and the deep sloughs and channels of water which abound over its surface. winds through this plain in a tortuous course, sometimes striking the bluff at one side of the valley, at others remaining for a long distance far within the plain and out of reach from the uplands. When the stream washes the foot of the bluff on one side of the valley it forms a natural communication with the regions of the interior. The towns and villages of the early settlements, and, indeed, every town of any importance in Missouri before the civil war, was located at such a place. Such were Cape Girardeau, St. Genevieve, Grand Tower, St. Louis, Hannibal, Louisiana, St. Charles, Jefferson City, Boonville, Glasgow, Lexington, Kansas City, Weston, St. Joseph and Forest City. Independence was not exactly on the river, but its shipping station was at Wayne City, a few miles north, and located like the others just mentioned. Independence was the starting point for the great wagon trains to Santa Fe and the far West. The steep hillsides of a bluff town were not suitable for deploying the large teams of oxen with which the wagons were drawn, so the town was located on the upland, about three miles from the river.

With the advent of the railway in Missouri the valleys began to decline in importance. The river transportation declined rapidly, so that within a few years after the civil war steamboating on the Missouri had become a thing of the past. It is now wholly abandoned excepting for extremely local traffic. On the Mississippi river it is still of considerable importance.

The railroads in the prairie regions of Missouri follow the uplands with very few exceptions. If a valley is to be crossed it is

done as quickly as possible. In very few cases had the previous locations of towns and villages anything to do with the location of the railroads. The towns did not depend upon any fixed industry, so that the railroad disregarded them. The railways then became the trunk lines of traffic and attracted the commercial population to points along their lines. For some time before this there had been some scattered settlements made by squatters upon the uplands. These were few in number and usually were not made up of the best class of farmers, so that when the first important railways were built across the state the greater part of the uplands were vacant. Along with the migration of the commercial population of the villages to the railways there was a corresponding movement of the agricultural population, or at least a more rapid occupation of the upland. Within a few years the population of the uplands had far outgrown that of the valleys in wealth and influence. The result was that the old towns were left to decay. Many old towns that were flourishing trading points before railroads were built are now almost extinct. Where the old river towns were fortunate enough to get a railway they have been saved from decay, but in many cases their growth, even under the new conditions, has been slight. The towns thus saved along the Missouri river are Jefferson City, Boonville, Glasgow, Lexington, Weston and the large cities. The towns which have become almost extinct are Augusta, Claysville, Providence, Rocheport, Arrow Rock, Waverly, Dover, Berlin, Wellington, Camden, Sibley and Forest City. Some of these were never of large size, but all were important shipping places and the centers of a large trade. All of them are now of much less importance than formerly and one of them, Berlin, is wholly extinct.

In the Ozark region the earlier settlements were likewise made in the valleys. In many parts of this region the settlements are still confined to them on account of the poor soil of the uplands. In certain parts of this region, on account of the character of the rocks, chert has accumulated so abundantly that the land is not worth the labor required to clear the timber off. In other parts of the region, however, much of the upland is now in cultivation. Until recent years the valley lands were the only places considered tillable and they are, in most cases, by far the most fertile.

The valleys are of two general classes, the straight and usually rather wide, open, and shallow valleys, and the tortuous, narrow and deep valleys. The former are usually occupied by the smaller streams, while the latter are usually, though not always, occupied by the large streams. None of the streams of South Missouri are navigable, excepting for very small flat boats, so that the traffic and travel was, and is, entirely overland. The location of the roads determined, therefore, the location of towns and villages to a considerable extent. The roads in all cases follow the ridges between large streams or else follow valleys of the broad, wide, open type. In no case do the roads follow the larger streams. is no road following the valley of either the Gasconade. Meramec. Osage, Current, Bourbeuse, Niangua, Sac, James or White rivers excepting near their heads. The roads approach them by a small tributary, in many cases by a short, narrow hollow, cross and ascend on the opposite side at the first opportunity. When a village is located on or near one of the larger streams, it is at the mouth of a small tributary and not a large one, or else it is situated on the small tributary a mile or so from the main stream. This is illustrated by Galena, the county town of Stone county. It is on James river at the point where the latter is reached by two small tributaries entering from opposite sides. Crane creek falls into the James only a very few miles above Galena, yet for a few miles above its mouth the creek has a tortuous deep and narrow valley difficult of ascent. The road, which follows down Crane creek for many miles below its head, leaves the valley about ten miles above its mouth, ascends a hollow, crosses the divide and descends another short, shallow hollow to the James at Galena. It crosses the river and ascends the small creek on the opposite side. Waynesville, Pulaski county; Linn Creek, Camden county; Van Buren, Carter county; Eminence, Shannon county; Steelville, Crawford county; in fact nearly every village in south Missouri which has any relation to one of the large streams shows this relation. Forsyth in Taney county is the one exception in south Missouri where a town is located on a large stream at the mouth of one of its largest tributaries. The large tributary in this case, Swan creek, is an exception in not having a tortuous valley, so that it offers the easiest road out of and into the large valley.

The villages located without reference to one of the larger streams, are either in the uplands or in the smaller valleys. When the latter is the case they are located at what the English geographers call a "nodal point," a point where several valleys of the same type unite. Such a point is naturally a collecting point for the population of all the valleys. One of the best examples of such a location is the village of Cassville, county seat of Barry county. It is located at a point where six or seven small, wide, flat, shallow and well-tilled valleys unite to form Flat creek. stream from the village there are only two or three small tributary valleys for a distance of twelve miles. Then another "nodal point" is formed by Little Flat creek, two nameless valleys, both followed by important roads, and the valley of Flat creek itself. This point is occupied by the village of McDowell. Neosho, in Newton county; Pineville, in McDonald county; Verona, in Lawrence county; Hartsville, in Wright county; and many other villages in south Missouri, show the same relation to their surrounding physical features.

The presence of large springs has also had great influence in village location in south Missouri, but this has not been so potent a factor as the facility for ingress and egress, since water can be easily reached in any of the valleys of south Missouri by digging shallow wells.

Another feature characteristic of the valleys of the first type described above, is the presence at the mouths of all the little ravines coming in from the sides, of detrital cones made up of irregular fragments of chert. These cones are usually ten to twenty feet above the level of the valleys, and extend out into the valleys to varying distances, the average area, however, being about one thousand square yards. These are used extensively as sites for farm buildings of all kinds. It is a general rule that where there are no bench lands along the sides of the valley, the farm buildings are located on chert cones at the mouths of tributary hollows. These locations give good drainage, and a position above the muddy valley floor, and the hollow gives easy access to the uplands. The presence of springs is also an important factor in farmhouse location in south Missouri, but there are many more farms than springs.

Mining.—The mining industry in Missouri includes both ore, clay and coal mining. The ore mining industry is confined to the southern part of the state, and includes lead and zinc mining, and a little iron.

Lead mining is carried on in several counties in a more or less successful way, but it is an important industry only in Jasper, Newton and Lawrence counties, in the southwestern; and in St. Francois, Washington and Madison counties, in the southeastern part of the state. The production of lead is greater than that of any other state in the Union, except those in which it is mined with silver. The oldest lead mines in the Mississippi valley are in southeastern Missouri. Mining has been in progress in that part of the state since 1720. It was the mining resort of the French of the whole Mississippi valley. The rivers and creeks, towns, villages and many of the mines have French names, and the land is cut up into oddly shaped tracts, the estates of early French and Spanish settlers.

Zinc is mined in southwestern Missouri and at one mine (Vallè's) in southeastern Missouri. It is mined with lead in southwestern Missouri, both occurring in the same mine and often in the same Zinc is much more abundant however than lead at the pres-Up till about fifteen years ago the zinc from these mines was not utilized. It was considered a valueless product and was thrown away with the other waste material. It now constitutes the principal source of income of the district. The lead and zinc are mined in rather shallow mines, the depth in very few cases exceeding 175 feet. The lead usually occurs nearest the surface and the zinc below. They both occur in larger cavities which have been dissolved out of the limestone rocks of the region by water.

The lead ore of southeastern Missouri occurs chiefly in little specks scattered through a porous limestone rock. It is called disseminated ore to distinguish it from more massive deposits like those of southwestern Missouri. The mines are deeper than those just described. In some places they are nearly 500 feet deep.

Missouri was for many years one of the leading states in the production of iron ore. For many years Iron Mountain and Pilot Knob, in Missouri, were famous for the quantity and quality of

their ore. They were supposed by many to be inexhaustible. Since 1887 Missouri has steadily declined in the rank of iron producers. There is not a single mine being operated within the state at the present time. Iron Mountain ceased to be a producer in 1893. Since that time the historic old mine has been completely abandoned. Pilot Knob was abandoned in 1890. Cherry Valley in Crawford county, the last of the historic mines of Missouri to succumb to decreasing quantity of ore and falling prices was abandoned during the past summer. The other important mines have been abandoned for several years. The decrease in production has been caused partly by the decrease in price of ore and partly by the exhaustion of the principal productive mines.

Coal is mined along a belt extending from the southwestern to the northeastern part of the state. The principal mining centers are Rich Hill, Bates county; Clinton, Henry county; Knob Noster, Johnson county; Lexington and Higginsville, Lafayette county; Richmond, Ray county; Huntsville, Randolph county; Bevier, Macon county; Mendota, Putnam county and a small industry at a few other scattered places. There are very few towns depending upon coal mining entirely, though a great number receive considerable income from this source. The market for Missouri coal is Kansas City and the towns and cities of Kansas and Nebraska. Very little of it goes to St. Louis or Illinois.

C. F. MARBUT.

COLUMBIA, Mo.

NOTES.

Climatic Zones on the Island of Sakhalin.—An interesting fact regarding the relation of the floral zones and meteorological conditions on the island of Sakhalin is noted in Ciel et Terre (Jan. 1, 1897). This island, lying off-shore from the eastern coast of Siberia, is surrounded by cold currents and is further exposed to the cold northwest winds from the mainland. At sealevel snow falls in May and lasts to the end of that month, and the coast is very cold. The climate becomes milder with increasing distance from the sea and with increasing altitude, the cold air accumulating on the lowlands near sea-level. In consequence of this

distribution of temperature the lowlands have an Arctic flora, while the higher and the intermediate heights have a temperature and, in some cases, a sub-tropical flora. This is a curious reversal from the ordinary condition of things, which gives more and more boreal vegetation with increasing altitude.—Science, March 19, 1897.

Northeastern Iceland .- "The interior of the Melrakki peninsula is a plateau sinking very gently northwards, and studded with numerous large and small lakes, more or less silted up. | Drift ice from Greenland often lies off the coast for months together during the summer, and brings snow and cold weather with it. The temperature is always cool in summer, and even when there was no ice to be seen, and the sky was clear, the traveller found that the mean temperature was never above 45° or 46° F., and often only 41°. When there is much ice the ground is often frozen throughout the summer to a depth of one and a-half to two feet. and white foxes are plentiful, and from them the peninsula derives its name. Bears, too, often come with the drift ice, but are immediately killed by the natives. Forty or fifty years ago drift timber was cast ashore in such quantities that the people not only obtained enough timber for their own needs, but sold wood to their neighbors farther inland. Now they have to dig up half decayed trunks out of the sand and dry them for fuel."—Scot. Geog. Mag., Feb., 1897.

Chili and Argentina.—"According to the new agreement signed on April 7th, the frontier between these States is to be drawn as far as 23° S. lat., along the course indicated by the treaties of 1881 and 1893. From 21° to 23° the boundary is defined by the truce of 1884 between Chili and Bolivia, and is so drawn on all good modern maps. From the Cerro (?) de Zapaleri (or Sapaleri) the boundary runs in a straight line to the volcano Licancaur. But Zapaleri lies nearly a degree of longitude east of the main cordillera of the Andes, which Argentina can claim, in accordance with the treaties, as the boundary as far as 23° S. Bolivia is to take part in the determination of the boundary from 23° to 27°, but Chile does not relinquish any part of

the Puma de Atacama, or undertake to move the boundary stone from San Francisco to Tres Cruces. The frontier from 27° to 52° will be delimited in accordance with the treaties, and any points of dispute referred to her Majesty the Queen as arbitrator. Many small differences will no doubt arise, but the only question of importance is whether the watershed throughout its length, or while it lies within the Andes, corresponds most closely to the boundaries indicated by the treaties, or the central line of elevation. Neither by the new agreement, nor by the commercial treaty ratified on May 1st, does Bolivia obtain a port on the Pacific.—Verh. der Gesell. für Erdkunde zu Berlin, No. 7." Summarized in Scot. Geog. Mag., Dec., 1896.

Territory of Santa Cruz.—In the Bol. del Instituto Geogr. Argentino, Tom. xvii., Nos. 7-9, Senor C. Siewert describes a journey to this part of Patagonia made in 1894. Puerto Gallegos, the capital of the territory, at which Senor Siewert landed makes, at first sight, no striking impression. The south shore is sandy and pebbly; the north exhibits cliffs 400 to 500 feet high, hills and flat-topped elevations, intersected by numerous valleys and ravines, almost always sheltered from the winds. Pretty houses and cottages, horses, cows and large flocks of sheep, enliven the landscape, in which the green of the pastures is conspicuous, though unprotected by trees. Except the Argentine officials, everything in Puerto Gallegos is English-people, language, animals, food and drink. Sheep-rearing is the industry of the place. one is a sheep-owner, or is interested in the industry. The animals are of Lincoln breed and become extraordinarily fat. Cattle are kept only to supply the local demand for milk, butter, cheese and meat. Draught oxen are dear, as are also horses. The houses, of wood and zinc, are very comfortable and furnished with a certain degree of luxury. Stoves are indispensable in the winter. Snow falls in the winter months, from the end of May to August, but it is not heavy and disappears in two or three days. Indeed, the winter is not as severe as might be expected from the coolness of the summer, when the thermometer rarely rises above 59° F. Winds, which are very disagreeable in summer, do not prevail in winter. In this season the guanacos come down into the valleys

in great multitudes and are so tame and bold that they may be caught by the hand. Beasts of prey are not troublesome; the puma is withdrawing more and more from the neighborhood and foxes have never committed depredations in the sheepfolds. Birds are numerous and of all sizes, from the ostrich downwards. Snakes are fairly common, but are not poisonous.

To the north of Puerto Gallegos bay, which runs eight or ten leagues into the land, are hills of sand, so compact that they descend in cliffs to the water. In the interior are lagoons of various dimensions, some salt and others fresh, on the banks of which grow shrubs that furnish fuel for the stoves. On this side there are no mountains. Towards the south are numerous heights of volcanic origon. Lava has run in all directions and covers a considerable extent of land. The most important groups of elevations are known as the Conventos y los Frailes, Los Tres Hermanos, La Sierra Negra, etc. The rocks are of a dark gray or russet color. At present the craters are quite extinct.

Senor Siewert's work led him into the interior, up the valley of the Rio Gallegos. The river is not navigable; its breadth is about sixty yards and its depth, on the average, not much over three feet. It flows with a slow current, describing great curves and moving from one side to the other of its valley, some two miles Thirty miles from the coast the country becomes more uneven, the ridges increase in height and the cliffs are steeper. At the Morros, where the Gallagos changes its direction, Senor Siewert stayed several days. The soil is fertile and the pasturage abundant and the scenery lovely, advantages which have led to the establishment of several sheep-runs, most of them belonging to Englishmen. The Morros are enormous, isolated hills, composed of columns of volcanic rock known as basalt, like the pipes of an organ. They are known as the Morro Philippi and Morro Domeyco. Near by are also the Morro Gay, the Morro Cuadrado, and, in Chilian territory, the Morro Chico. Except the last, all are bare of trees and the snow in the fissures on their summits never disappears throughout the year. A large lagoon, more than two leagues long and one broad, lies at the base of the Morro Philippi, about which are seen multitudes of flamingoes, swans, ducks and geese; it also contains fish. In this region the Gallegos receives

several important affluents, the Rubio, Condor, Sudro and others. Game is abundant in the neighborhood; in the open are the ostrich and the guanaco and among the hills the puma, wolf, fox etc.—Scot. Geog. Mag., Feb., 1897.

The Icefall on the Gemmi Pass.—A destructive icefall that occurred on the slope of the Altels peak on the southeast side of the Gemmi pass in Switzerland on September 11, 1895, is described by Professor Heim, of Zurich, in the New Years Journal of the Natural History Society of Zurich, 1896. About four and a-half million cubic meters of ice slid down an incline some four kilometers long, descending from an altitude at 3,200 meters to 1,900 meters. Gathering about a million cubic meters of rock waste on the way, the gliding mass ran across the valley floor, dashing far up on the opposite slope and then falling back, like a wave from a cliff. Finally settling, the debris occupied a square kilometer of surface to a depth of about five meters. A bench on the path of the sliding mass, two hundred meters above the valley floor, caused it to spring forward, like a boy's sled passing a "hump" in his coast, for a time clear of the ground; then falling, the air beneath it was violently driven out to either side, overturning large trees for several hundred meters laterally and forwards, and thus nearly doubling the area afflicted. A house was destroyed and some of its occupants were killed: pasture and forest land was laid waste.

W. M. D.

Discovery of a Fishing Bank near the Azores.—"Prince Albert of Monaco reports that while cruising this year on his yacht, the Princesse Alice, at a point about 55 miles south of the Azores, where depths of 1,000 to 1,500 fathoms were expected, the lead touched the bottom at a depth of only 790 feet. A thorough examination of the neighborhood was made, and it was found that there exists here a bank of 34 miles in circumference, with two culminating points, at a depth of 250 and 625 feet, respectively. The bank, which was named the Princesse Alice bank, was found to be remarkably rich in fish, and is thus likely to create a new industry for the inhabitants of the Azores."—The Geog. Journ., Jan., 1897.

Angola.—One of the principal articles in the Scottish Geographical Magazine for November is upon Angola in Africa. This country is described as one of the most fertile in the world, yet almost wholly undeveloped, though the Portuguese have been in possession of it for four centuries. This is due mainly to defects of administration, the officials being chosen, not for their capacity to govern the natives, but often as a punishment for some offence. The European army consists chiefly of military convicts. Another reason for the lack of growth is that, of the two crops solely cultivated, coffee and sugar, the latter is used mostly in the manufacture of rum, which is sold to the natives. The soil is rich in mineral deposits—iron, copper and gold being found in all parts—but the mining, "concessions are granted by the Portuguese on terms calculated to crush an infant industry, the price of the minerals extracted being fixed at Loanda."

R. E. D.

The Relief of the Land.—The Indiana State Board of Education gave in January the problem, "State the general laws of relief," which brought out in February the following helpful comment in the Inland Educator. "The question is too vague to be answered with any degree of accuracy. Perhaps the laws of continental structure as given by Guyot are meant. (See Guyot's Physical Geography.) Scientific geographers of the present day attach very little importance to such analogies, and the idea of any unity of continental structure is regarded by many as a delusion. The primary highland or "backbone" theory fits only the Americas. The most general law of relief is that massive elevations like continents and plateaus are due to deformation of the earth crust, and all the minor features, as mountains, valleys, etc., are due to subaërial erosion. Drainage controls relief much more than present relief controls drainage. No study which does not look behind present conditions can explain the course of the Colorado, Susquehanna, Rhine, Danube, and many other rivers which flow against the general slope of the country, and pass through and across mountain ranges without deflection." R. E. D.

EDITORIAL.

THE editor has received many inquiries within the last few weeks as to the use of text-books in geography, and several people have asked information as to the best text-book in the market. The latter question is one that I must decline to answer, for the JOURNAL must not support any one author or publishing house. The first question I am unable to answer for the following reasons:

The best text-book for one teacher may be a very poor one for another teacher. That book which gives the teacher the best arranged knowledge that is old to her and the most new material that she has the power to apply is the best for her. No one text-book can be the best for all schools until all our teachers are equally prepared for their tasks. New text-books in geography are appearing constantly, but it is safe to say, I think, that the book destined to be classic has not appeared and cannot appear for some time to come. Each new book is but a help to the writer of the next new one. When the time comes that the present interest in geography work has abated somewhat, it will be possible perhaps to combine much that is good and now scattered. Then we will have a book better than any at present.

The problem of how to use a text-book is another matter, concerning which much must be learned by experience. The writer has found it most profitable to have the pupils in the lower grades use but a very small amount of the disconnected, incomplete and oftentimes childish reading matter of the text-book. Much use must be made of the maps and illustrations, but the reading matter should be more for helping the teacher than the pupil directly. It should suggest to her lines of thought and progress and be a guide rather than her sole dependence. If she can enrich the matter given in the text-book with information gathered from other sources the pupils will gain much from the work. They will gain but little if they are made to study any text-book as a complete source of information for the quality of work for which they are sufficiently advanced.

In the latter grades it has been found a good plan to have one text-book, to be used as the principal source of information regard-

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ing the topics suggested as guides in study by the teacher. This one book should be supplemented by several others on the teacher's desk, to be used as reference books. I think that the day is fast arriving when our schools will divorce themselves from the idea that any one book contains all that is good.

However the book is used it must be remembered that the object of geography work is not to store the mind with information, but to give a broad knowledge of the larger features of the world and to impart the ability to find out each for himself what is wanted. To know how to use a map, an atlas, an encyclopedia or a book of reference or travel is far more important than to know "what city manufactures the most fish hooks in the United States" or the list of capes along the Atlantic seaboard.

REVIEWS.

Longman's Geographic Series, Nos. I, II, III and V. Longmanns, Green & Co., London, New York and Bombay, 1896.

The series of four books included under the title above are supposed to be concentric; that is, there is a common geographic basis and each book is but an elaboration of the material of its predecessor so that the child has an advancing understanding of geography as he passes from book to book.

The first is an introductory book known as "The Child's First Book of Geography." It opens with a consideration of the earth as a whole and of the larger physical features. The statements are usually too meagre and in many cases not clear. The illustrations are fairly good. The child would not, however, gain a good understanding of the earth features from such a brief introduction as is given in the first twenty-two pages of this book. There is too much of the definitional and too little of the observational in such an introduction to the geography of the world. The larger part of the book is devoted to the geography of Europe and Asia taken by countries. The maps are fairly good, although, in many cases, the long series of railroads with no towns upon them are confusing and unnecessary. On the whole, the descriptions are too brief and the work calls for too much memorizing to be in

line with modern geographic thought. The book is not simple nor interesting and makes, to our mind, a great mistake in not giving the child an understanding of the world as a whole or the relation of one continent to another upon the globe. The indefiniteness of some of the material is shown by the following phrase; "The Hudson flows through the eastern states and is famous for the beauties of its scenery."

In the second book, which is entitled "The World for Junior Students," there is a vast amount of information compiled in a more or less encyclopedic way. There is still, however, no conception of the world as a whole. The introduction includes many phenomena regarding tides, atmosphere, ocean currents, etc., that are very helpful, but the rest of the physical geography seems to pay too much attention to some unimportant details and too little attention to rational classification. The movement of the prevalent winds and the ocean currents is given as a law, but no statement is made of how to make clear to the mind of the child the necessity of the law. The illustrations are, on the whole, poor; the local maps are fairly good, although not so much an improvement upon the first book as could well be desired. The book contains a vast deal of information, but, like many of the geographic books published by this house, the information is not so arranged as to be readily used by elementary pupils.

The third book, "The World for Senior Students." follows the same plan as the preceding one and is in many ways not very much in advance of the book for Juniors. The illustrations are largely the same and the plan of treatment similar, with the introduction of more maps and more details. It does not, however, seem to merit the position in the series, for any one capable of understanding the junior book could use this. The same criticisms are possible regarding this book as its supposed predecessor. For the student of commercial geography it is a valuable book of reference, but it is not a valuable book for study.

The fifth book, "A Primary Physical Geography," covers subject matter which could well be introduced in the middle grades of our common schools. It does not, however, cover it in such a way as to make the book most serviceable in such an introduction. The choice of materials is good so far as it goes; the illustrations

are fair, but could well have been more numerous; the considerations of the earth, the air, and the ocean contain little that is new in the way of treatment and are again too definitional and, on the whole, uninteresting. The glossary at the back is extremely good, describing as it does in a terse way all the common terms used in the book as a whole.

The series are not serviceable for introduction into our common schools, but each one contains material that could be of great help for illustration to the common teacher and numbers III and V would make very helpful books of reference for teachers' desks. Unfortunately, the books are written for English and not American use and hence they are not as serviceable as they might be for our schools. They do, however, contain a great deal regarding our neighbors across the water that is not readily obtained in the books in common use in this country. Hence their value in keeping due relation of attention between the geography of this country and other parts of the world.

R. E. D.

Africa. Vol. I.: North Africa. Pp. xvi and 639, 9 Maps, 77 Illustrations. Vol. II.: South Africa. Pp. xvi and 671, 11 Maps, 92 Illustrations. By A. H. KEANE. London, Stanford, 1895. (In Stanford's Compendium of Geography and Travel.) Price, 15 sh. per vol.

When the late Keith Jonston treated African geography for the first issue of this series, one volume was thought sufficient. In the present issue, the single volume is replaced by two, each larger than the original work, of which nothing remains except a few passages in quotation marks and a part of the Ethnological Appendix, and Professor A. H. Keane, the author of the present work, has found the more than doubled space scarcely adequate for a proper exposition of the great accumulation of facts relating to Africa. Professor Keane brought to his work the twofold advantage of having given close attention to Africa in its ethnological aspects, and of being the translator of Reclus's work, of whose method of developing the subject one is often reminded in these volumes.

The work is well indexed and for purposes of handy reference will be useful, not only to specialists but also to the general stu-

dent or reader for whom it is, indeed, chiefly prepared. Each chapter deals with one of the geographical divisions into which Professor Keane has divided his subject, giving all the information of every sort, concerning each particular region, including the treatment of its physical features, natural history, political history and questions, ethnology and exploration, the whole set forth clearly and in a readable manner, with due sense of proportion and a high standard of accuracy, according to our present lights. liberal use of temperature records in the climatological paragraphs would have been welcome. The author has made minute and extensive use of authorities, especially British and German; and the reader very often meets an allusion to some interesting matter that shows exhaustive preparatory reading. One among numerous instances is Macdonald's discovery that the Tchad basin has no connection with the Niger system through the Tuburi swamps, as had long been asserted, Macdonald's proof to the contrary appearing in his report to the Royal Geographical Society in 1891.

Professor Keane avoids most of the controverted questions of African geography, but the student may be too likely to infer, from the topographical map with which the second volume opens, that geographers are now able clearly to define the water parting between the Nile, Congo and Shari basins, and the orography of the region within the bend of the Niger. The work is rich in maps, excellent of their kind, but those who are accustomed to more satisfactory methods of expressing topographical aspects, used by German and some other cartographers, may long for something a little better. The pictures are mostly unpretentious woodcuts, but as a whole they are the best we have seen in any book of moderate price, for they are well chosen, characteristic and accurate, and thus they help the text.

C. C. A.

THE.

JOURNAL OF SCHOOL GEOGRAPHY

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

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One dollar a year in advance. Single copies 15 cents. Subscriptions should be sent to the Journal of School Geography, 41 North Queen Street. Lancaster, Pa.

Mas. intended for publication, books, etc., intended for review, and all correspondence, except concerning subscriptions, should be sent to the reponsible editor, Richard E. Dodge, Teachers College, 120th Street West, New York City:

THE CANADIAN ALPS.

I have just been turning the leaves of a very modern school geography to discover what it says of one of the most notable regions upon our continent, and find—almost nothing. Of course, the world is large, its localities infinite in number and the best of geographies can only briefly set forth the facts of any one, as for instance, to say of Switzerland that "hotel keeping is a leading industry," and add in the way of comment that "every summer thousands of tourists visit the country to see its mountains, glaciers, lakes and waterfalls." Brief as is the mention, however, it flashes on the mind connotations for a whole chapter, and leaves Switzerland standing vividly before the imagination.

But who has learned from any geography of a region in America that deserves to stand as its only less glorious counterpart? And yet the geography-makers know of it. They merely omit to present the facts with the telling emphasis, coupled with the familiar place-name. To prove it, I open Frye's Common School Geography at page 31, to the discussion of the Rocky Mountain System, and find the proper record that "northward from the border of the United States the Rocky mountains are not far from the Pacific coast and, therefore, receive plentiful

rainfall. For a great distance the range is still lofty. Its summits are heavily snow clad, and large glaciers are found on its slopes." The statement is ample and adequate; but it pesents a vague fractional part of a great mind-straining concept, that of the vast uplift reaching from the Rio Grande to the Yukon. Again I open to page 27, and note a picture that calls up the unfading memory of a spot, to my mind, combining more of grandeur and wild beauty than any I have seen in any land. It is entitled "Scene in Rocky Mountains." A glance shows to the specialist that it is not within the United States—the outline, the remarkable stratification that conditions the outline, the living glaciers, all forbid it. It is in Canada. It is Mt. Green * rising in queenly repose from the turquoise blue waters of Lake Louise. Those cliffs, a thousand feet in height, are crowned with hanging glaciers, that all day long at intervals are hurling down their tribute of ice to keep up the supply of the lower glacier that fills the valley bottom above the tree line. The lake itself lies as high above the sea as the summit of Mt. Washington, and Mt. Green rises 5,000 feet higher yet-nearly to the maximum altitude of the Canadian Rockies-11,500-12,000 feet.

Now I turn to what is said of Canada, on page 158, and find no allusion to its "mountains, lakes, glaciers and waterfalls"—that is, to the wonderful natural scenery that ought in all justice to bring to British Columbia every year hundreds of tourists in search of beauty and grandeur, and scores of teachers in search of fields of study. It is but four days from Boston, two from St. Paul, and no region nearer than the Alps can compete with it in furnishing an opportunity to study the various features of glacial action and mountain topography.

At the risk of repeating what may be generally known, I venture a few words concerning the subdivisions of the Cordilleran belt in Canada. That the Rocky mountains retreat rapidly westward as they proceed north from their farthest easterly limit in Colorado no one can have failed to notice. That they retire half

^{*}So called on the map of Mr. S. E. S. Allen, one of the most active explorers of this region. The Rev. W. S. Green, in his "Among the Selkirk Glaciers" calls it Mt. Lefray, confusing it with the peak next south of it on the Continental Divide.

the entire distance toward the coast, so that the width of the Cordilleran belt opposite Denver is 1,000 miles, while opposite Calgary, in Alberta, it is only about 500 miles, is a less familiar fact. As a result, the mountain ranges are much more crowded upon each other and their grandeur is the more concentrated. Out of the complex of ranges filling this narrowed space four principal ranges may easily be discriminated, a distinction based upon the great river systems. First come the Rocky mountains proper, draining on the east into Hudson bay by the tributaries of the Saskatchewan, and on the west into the Columbia. Then, within the great bend of the Columbia (of which more directly), lies the great Selkirk range. Next west, between the southward flow of the Columbia and Fraser rivers, we have the lesser Gold range; and between the Fraser and the Pacific, what may, for the lack of a better name, be called the Coast range—though off the coast Vancouver island represents a section of a submerged real Coast range. one making the journey across the continent each of these regions presents a distinct and typical character.

The Selkirks, it will be seen, occupy a peculiarly interesting position, which suggests a point of which advantage might be taken in class work. I distinctly recall from my earliest school years a question asked our class studying the map of South America: "Who will find first the island of St. Anna?" When at last it was pointed out to us in the very heart of Brazil, it made an immense impression and left in our minds much more than the useless name of one more island. Now there is something very similar connected with the flow of our great river of the northwest. Some will no doubt recall its course from Columbia lake, as it flows northwesterly for some 200 miles as if to enter the Pacific in Alaska; then it makes a sudden bend to the south, and perhaps 500 miles from its source (now a mighty stream) it enters our national domain to serve at length as a boundary between Oregon and Washington. Have any noticed in connection with it the flow of its chief Canadian tributary, the Kootenai? How it rises considerably farther north than the Columbia, flows southward—in the exactly opposite direction—through a neighboring parallel valley—just as the upper Loire reversely parallels the Rhone? one point it comes so near as almost to empty its waters into Columbia lake, but it passes on and crosses into the States, only to return shortly into Canada and finally to give to the Columbia with interest the dowry of which it disappointed it at its birth. It is reported that in freshets the waters of the two rivers actually mingle. In this case we possess a remarkable island of the St. Anna type, or in any event something very near it.

Now in such an island, and forming its great backbone, rises the fine range of the Selkirks. Owing to the fact that the earliest mountaineering sport among these Alps was conducted here, the name is beginning to be heard, but in most instances misapplied, the majority seeming to think "the Selkirks" another name for the Canadian Rockies. This is a grave mistake. It is as if the White mountains should be called the Franconias, only worse. The relation of these mountains to the Columbia river and their different geological structure mark them as another range. Even to the casual observer they offer a different character. The main range of the Rockies-the Continental Divide-is loftier, its highest peaks attaining an altitude perhaps 1,000 feet higher than the loftiest Selkirks, which harldly surpass 10,500 feet. The stratified rock in the Rockies forms a striking element in the landscape, remarkably affecting the mountain architecture. Vast faces of perpendicular cliff rise sometimes several thousand feet sheer, and may extend for one or two miles without a seeming break; or there may be presented tier above tier of less formidable single walls; or else castle-like crowns capping mountain masses seemingly inaccessible. The shaly structure of these rocks offer a great leverage to the meteorologic forces, and these mountains are rapidly falling to ruin. In the higher valley among the Rockies are many glacial lakelets, some of considerable size, as Lake Louise and Bow lake, while small tarns of green and icy water are numberless. Selkirks are of firmer texture and assume less varied forms, affecting rather the spire-like types common among granitic mountains. They are, moreover, robed in general in larger and more beautiful glaciers, for the annual precipitation is far greater here than in the Rockies proper. Another result of this is the ranker forest undergrowth and the heavier timber, which is principally evergreens, the spruces and firs. In these mountains the glacial torrents do not tarry to deposit the detritus of their milky waters in

pale blue lakes, but hurry down with it on either slope of the swirl of the tawny Columbia.

In speaking of the glaciers among the Selkirks as larger, I have purposely said "in general." One notable exception must probably be made, the as yet unexplored snow-field which caps the Continental Divide for at least a score of miles north of the Hector pass, where the range is crossed by the railway. peculiar configuration of the interspaces of the parallel ridges seems to have offered a place for winter snows to lodge and accumulate, so that there will probably be found one of the largest reservoirs of névé, if not the very largest, existing this side of The ice streams, however, which are after all the distinctive feature of glaciers, will doubtless not exceed those usual in this region. To correct a possible false impression, it should be stated that with the largest Swiss glaciers (like the Great Aletsch with its ice stream fifteen miles in length) no Canadian glaciers can be put in comparison for size; on the other hand few Alpine ice falls surpass in precipitousness and exquisite beauty the Illecellewaet glacier near Glacier House in British Columbia, descending 2,000 feet in less than two miles.

As regards their scenery the more westerly mountains, the Gold and the Coast ranges, offer comparatively less of interest, yet the fine development of lakes among the more pastoral beauty of the broad valleys of the former, and in the latter the wild scenery of the narrow canyons of Fraser river, by which the Canadian Pacific Railway approaches the coast, offer pictures of varied interest to the tourist and rich sources for the student of geography and natural history.

Man counts for but little in his relation to much of this region. His presence for the most part is indicated only by the railway. Civilization knew practically nothing of these mountains within two decades. The pass whereby the railway crosses the Selkirks was up to 1883 unknown, so far as appears, even to the aborigines. The rich veins of the precious metals are now drawing large numbers into the region west and south of the Selkirks, as much earlier they came to the Fraser district; a few good mines of coal and lead have been opened in the Rocky mountains near the railway. Of Indians comparatively few to-day use the difficult trails through

the almost inaccessible valleys, largely hunters seeking the skins of the grizzly and cinnamon bear, and the mountain goat which, with plentiful lesser game, still haunt the remote parts of these ranges. But to one who loves this region for what it has revealed to him, it seems incredible but that one day its wealth of natural beauty shall be to it a source of richness, and that the introduction of the human element shall confer upon its austere beauty the milder aspect that lends to Switzerland its superior charm.

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THE CASCADE MOUNTAINS.

The Cascade mountains, extending through Washington and Oregon, from north to south, differ from all other mountains in the United States because of their large number of extinct volcanoes. They are one link in a general chain of high mountains near the Pacific ocean, extending from Alaska to Patagonia. A glance at a map of the two Americas will show clearly the succession of ranges constituting this great chain.

Beginning at the angle in Alaska, where the coast line seems to turn upon Mount St. Elias as a pivot and swing from west to north, a range runs south along the coast until it is cut by Fraser river, near the southern boundary of British Columbia. usually called the Coast mountains, this range is in fact a northerly The true Coast range begins on Vanextension of the Cascades. couver island, reaches its highest points in Mount Olympus and Constance, between Puget sound and the ocean, and follows the coast line closely through Washington and Oregon and nearly through California. The Cascades are the continuation of the Alaska and British Columbia range, about 100 miles from the ocean, and are themselves continued southward through California The next link in the chain is the Cordilby the Sierra Nevadas. leras of Mexico and Central America. Then comes the great Andean chain, following the coast line from Columbia to Patagonia, reaching its highest elevation in Bolivia, about 24,000 feet, the highest point on the American hemisphere.

Along this great Pacific chain of mountains there are, at varying intervals, huge volcanic peaks, covered with perpetual snow and having on their sides tremendous living glaciers, the best known of which are St. Elias (18,023 feet), in Alaska; Edgecomb (13,000 feet), in British Columbia; Ranier (14,519 feet), in Washington; Hood (11,758 feet), in Oregon; Shasta (14,-440 feet), in California; Popocatapetl (17,540 feet), in Mexico; Chimborazo (28,424 feet), in Equador; Arequipa (20,000 feet), in Peru; Illampu (the highest, 24,800 feet), in Bolivia and Aconcagua (22,422 feet), in Chili. Of all this chain the mountains of Oregon and Washington possess the largest number of volcanic peaks and give evidences of the greatest volcanic activity. These evidences are the numerous craters along the mountain summits and the great blanket of lava that covers the entire Cascade region, the erosion of which has produced the rich soil which supports the luxuriant forest growth.

The Cascade mountains were raised in the usual way by gradual upheaval from the ocean, reaching varying altitudes up to 8,000 feet, but the great cones rising from 1,000 to 7,000 feet higher, were built up around the discharging vents of volcanoes. There is a marked difference between the mountains that have been gradually elevated and those that have been accumulated about volcanic craters, the former being more connected and rolling, and the latter standing out as single peaks, appearing to rest upon the other mountains, their sides having great lava ridges and basalt cliffs, and seamed with tremendous canyons down which glaciers grind their toilsome way.

Among these extinct volcanoes there is one that is unique in the world, so far as exploration of the globe has revealed. This is the one known as "Crater Lake," * in southern Oregon. Mount Mazama, the name given this wonderful volcano, probably once exceeded 15,000 feet in height, but at some time all that portion above an altitude of 8,000 feet suddenly fell back into the depths from which it had been spouted out years before in molten form, leaving a tremendous hole nearly six miles in diameter and 4,000 feet deep. Subsequently another vent was opened, piling up a second cone within the first to a height of 2,500 feet, or 1,500 feet

^{*}See note on page 23 of January number.

below the rim of the great circular cavity. When volcanic activity ceased and the heat disappeared, water collected in this enlarged crater to a depth of 2,000 feet, leaving the new cone, with its small crater, thrust above the surface of the water to a height of 500 feet. This is known as "Wizard island." The result is Crater lake, a circular body of the deepest blue water, nearly six miles in diameter and completely surrounded by almost precipitous walls of rock 2,000 feet in height and 8,000 feet above the level of the sea. With the exception of a few peaks, the edge of the cliffs surrounding the lake is much higher than the mountain summits; Mount Mazama, as in the case of the other volcanic peaks, seeming to rest its base upon the mountains themselves. Snow remains in places about the mountains and in the crater of Wizard island the entire year round.

The forests of the Cascades are very dense and the trees large. This is due to the mildness of the climate and the humidity of the atmosphere. The rainfall is very heavy, and warm, moisture laden winds from the ocean penetrate the mountains except during the summer months, promoting a luxuriant growth of vegetation. Fir trees reach an extreme height of 400 feet and a diameter of 15 feet, trees half these dimensions being very common. Cedar trees have been found as large as the firs, but fully a third shorter. These large trees grow on the lower levels, the size and character of the timber decreasing and changing as altitude is gained. forests crown the mountains to their summits, except the volcanic cones, on whose sides the forest line terminates between the altitudes of 8,000 and 9,000 feet. Above this height the peaks are masses of snow, ice, lava cliffs, glaciers and glacial moraines. The last trees at the timber line are stunted in size and twisted by the storms that sweep around the peaks in winter. They are of several varieties of spruce, fir, pine and juniper, the latter becoming finally but a creeper on the exposed moraines. The foliage, especially of the Alpine spruce, is a brilliant green.

Some of the volcanic peaks still give traces of internal heat, while others do not. These evidences are found in craters or in rocks forming the crater rim. On Hood, at the lowest part of the crater, at the upper base of Crater rock, which forms the southern rim, there is a fumarole, from which steam and sulphur fumes are

emitted, and in the crevices of Crater rock, the heat reaches a temperature sufficient to melt snow or warm coffee for drinking. Ever since the first settlers came to Oregon, three quarters of a century ago, there have been claims made every two or three years that Mount Hood is "smoking."

It is quite clear, however, that nothing like an eruption has occurred, and the "smoke" is believed to be snow blown up over the mountain summit by a sweeping gale, and made visible in favorable conditions of the atmosphere. Those who live near the mountain often notice this phenomenon and have established its character with telescopes. In the crater of Mt. Adams there is also, probably, a vent, though so situated as not to be visible from any point of view mountain climbers can reach. A strong sulphuric odor is very noticeable at a point above the crater and some distance below the summit. On Rainier there are mud springs and steam vents, also on Shasta, in northern California. St. Helens, also, has these evidences of volcanic fires not yet extinct, and an eruption of that mountain, by which ashes were scattered about for a distance of 30 miles, is claimed by pioneers of 60 years ago.

How long a time has elapsed since the last volcanic activity is a matter of mere speculation. It must have been several centuries, since the Indians know of it only in a traditional way. The Columbia river Indians have a tradition that at one time Mounts Hood and Adams, respectively 20 miles south and north of the river, stood on the river bank, but that they fell to fighting and spitting fire at each other, and the great spirit moved them further apart, so that they could not quarrel any more. This would seem to indicate that many generations have come and gone since the last real volcanic eruption occurred.

The craters of the volcanic cones are now filled with ice, covered with snow. The depth of this ice is unknown. In the crater of Hood there is a crevasse half a mile long and 10 to 30 feet wide, formed by the breaking away of the ice on an extremely steep slope near the upper rim of the crater. All efforts to find the bottom of this crevasse, by the use of ropes and weights, or by rolling lava rocks into it, have failed. On the steep mountain slopes and on the glaciers there are other crevasses, wide and

narrow, shallow and deep, regular and broken, all of them glistening with the inimitable glacier green, but none of them so great as this yawning chasm in the crater of Hood.

On each of the great volcanic peaks there are from one to half a dozen glaciers. These rivers of ice occupy huge canyons on the mountain sides, and move steadily down a few feet each year to the level, where they are affected by the summer heat and, melting, become the fountain heads of rivers. These streams usually issue from caves in the ice at the lower face of the glacier, and the water is almost as white as milk. The streams thus formed are augmented by hundreds of rivulets from melting snow, and from springs on the slopes from which the snow has disappeared, and soon become mountain rivers of considerable volume. down which the glaciers move are irregular and the crowding of the ice through the narrow portions heaves the surface of the glacier into great irregularity. There are high ridges and hummocks and innumerable crevasses, rendering travel over them difficult and sufficiently dangerous to require great caution. The Mazamas (a mountaineering society with headquarters at Portland, Oregon,) will begin gathering data this year for estimating the movement of the glaciers on Mount Rainier. This is to be done by observing carefully the relative positions of prominent objects on the glacier and on the solid ground. A like observation a year later will reveal the change in position and form a basis for estimating the rate of glacier flow.

The white covering of the volcanic cones generally seen is not the perpetual snow and ice, but the fresh snow of the previous winter. Because of the meteorological conditions previously stated, the fall of snow in the mountains is very heavy, and it often accumulates to a depth of 30 feet. As summer approaches the snow line retreats up the mountains until, usually, the snow line and timber line are nearly together. Occasionally all the new snow of the season melts, and then the snow line is at a considerable elevation above the edge of the forest. It is only in such seasons, in August, usually, that the peaks are reduced to the coating of icelike snow accumulated through the ages. On the surface of the snow, far above timber line, I have found crickets and lady bugs, and have seen butterflies flitting about, evidently carried thither

by strong winds. Two kinds of animals inhabit these bleak alpine heights, the bighorn, or Rocky mountain sheep, and the Mazama, or mountain goat, the American chamois. They are not numerous, are very rarely seen and much more rarely killed by hunters.

The animal life of the Cascades, as would be expected of a region of such luxuriant vegetation, is varied and abundant. Once elk and deer were numerous, but persistent hunting has sadly reduced their numbers. Grizzly, black, brown and cinnamon bears and cougars, or mountain lions, are still quite plentiful, though hunting has also reduced them. Squirrels, foxes, badgers, coons and wolves are also numerous. Mountain quail, grouse and partridges are the game birds, while a great many varieties of smaller birds are found. The forests abound in wild flowers of many kinds, and there is a dense growth of shrubs, many of them of flowering varieties, making the forest brilliant with color in spring time. The large flowered dogwood is the most noticeable and the most abundant, though the red blossoms of the wild currant, the syringa blooms and spirea festoons vie with them in beauty. Higher up the mountains the beautiful rhododendron is found in abundance, the queen of all the wild flowers of this region.

There is one noticeable feature of the Cascade Mountains, and that is the fact that but one route through them has been opened by nature, the route of the Columbia river. The gorge of the Columbia, through which the river has cut its way as the one great channel to the sea of the entire intermountainous region lying between the Cascades and Rockies, is bordered by great basaltic cliffs, in places 2,000 feet high. One line of railroad has been built along this water-level route, terminating at Portland. have been built over the mountains, one terminating at Tacoma and the other at Seattle, but the grades are very steep, and each requires a tunnel at the highest point more than a mile in length. The river is navigable for steamers many miles inland, except at two points, one in the gorge and one just east of it. The former obstruction has been overcome by the construction of a canal and locks, and the Government has undertaken to build a boat railway around the other, thus opening the river to continuous navigation H. L. Wells. through the mountains.

PORTLAND, OREGON.

LABORATORY WORK IN ELEMENTARY PHYSIOGRAPHY.

The laboratory work to be described in this article has been undertaken in the belief that the laboratory can be used in elementary physiography, as it has long been used in the other sciences, as a most important aid in developing the interest of the student, in arousing him to think and work and in fixing in his memory the facts learned from a text-book.

The pupils who have done this work have been members of the second year's class in the Academy counting from entrance. This is the first science work done, physics and chemistry following this year's work in the third and fourth year respectively.

The weekly program has been the same in physiography as in physics and chemistry so far as the time allowance is concerned. Five exercises have been held weekly. Two of these have been prepared recitations of one hour each, two have been laboratory exercises of two hours each and one has been an unprepared recitation. The unprepared recitation hour has been devoted to the laboratory work. Thus seven and sometimes eight hours per week have been spent with the teacher. Physiography divides itself naturally into four divisions, viz.: (1) the earth as a planet, (2) the air, (3) the sea and (4) the land. Some of these divisions lend themselves to laboratory illustrations more easily than others, yet exercises have been assigned from the subject matter of each of these divisions. The work continues through one year.

This work has been conducted class wise, i. e., all members of the class have been engaged on the same exercises at the same time. The class numbered 13. A larger number could have been handled just as easily, but 24 is probably the largest number that one teacher could handle without assistance. The work was done in the Physical Laboratory upon tables whose dimensions are 11½ ft. x 42 in. x 32 in. high. Each table will accommodate 8 pupils. The ordinary single school desks are not large enough to hold many of the large maps and diagrams used. Each pupil should keep two note books, one for preliminary and one for final record. The note book of final record was frequently examined.

The answers which students had given to the assigned questions were generally read and discussed in class. The corrected answers were then put in the book of final record.

Library work has also been introduced with good results. Students were required to find answers to assigned questions in the literature of the subject. These answers were to be elaborated into a connected narrative, then read and discussed in class and then copied into a final note book.

Many of these exercises, both laboratory and library, can be done by pupils in the upper grammar grades. The exercises are suggestive of what may be done by teachers who have the necessary time and equipment. The outfit in the way of apparatus is quite inexpensive.

It does not seem necessary to urge the importance and desirability of laboratory work. All science teachers will admit that laboratory methods are the best wherever the necessary time can be obtained and where the classes are not too large. The proper laboratory for physiography and geology is the field, the valley, the mountain and the shore. Properly and carefully planned excursions to points of interest in the vicinity are an obvious and almost indispensable means of instruction in these branches. Since no locality furnishes all the typical physiographic forms that the student should study, we must resort very largely to pictures and maps as a means of bringing before the class those things which they cannot see for themselves. The stereopticon, therefore, is another very valuable aid to the teacher. If carefully selected slides are used, illustrative of different physiographic features, members of the class may be called on to explain how the picture illustrates the subject under consideration. Neither excursions nor the lantern are considered in detail in this article, though both have been made a part of the laboratory work.

Laboratory work has its dangers and it may be so conducted as to be a complete waste of time. This will happen if the teacher's plan has not been thoroughly thought out, or if the supply of apparatus is insufficient, or the time allowance inadequate for the proper completion of the exercises. Laboratory directions should be precise and clear. They should tell the student exactly what he is to do, but not what result he will obtain, exactly where to look

but not what he is to see. I have tried to observe these rules in the directions given in the exercises which follow. In the list below no exercises are given that have not been actually tried in the laboratory. I have a number of others in contemplation but prefer to give only those that have been worked out with a class. I divide the list into two parts:

- I. Laboratory Exercises.
- 1. Construct a diagram which shall represent some of the facts of the solar system including (1) relative distances of the planets from the sun; (2) their sizes relative to each other and to the disk of the sun and (3) their satellites. Two days.
- 2. On the same sheet, which was about 80 inches by 18, construct a diagram to show (1) the inclination of the earth's axis to the plane of its orbit, (2) its perihelion and aphelion positions, and its position at the equinoxes and solstices. Two days.
- 3. Measurement of the sun's altitude by means of the clinometer.
- 4. Plot curves to show the daily maximum, minimum and average temperature, the barometric pressure and the rainfall from records kept by the student for the month of December, 1896. Two days.
- 5. Determine the dew point and relative humidity. This exercise was preceded by a study of the Centigrade thermometer and a comparison of it with the Fahrenheit. Relative humidity was determined from the published tables.
- 6. Illustrate the constituents of the atmosphere (1), Dust (2), Water Vapor (3), Carbon-di-oxide (4), Oxygen (5), Nitrogen (Teacher's experiment). One day.
- 7. Construct a map showing the drainage slopes of the United States. One day.
 - *8. Preliminary study of a topographic map. Three days.
 - 9. Study of a coast survey or lake survey map. Two days.
 - *10. Study of the Washington weather map. One day.
 - 11. Study of the North Atlantic Pilot Chart. Two days.
- *12. Construction of a weather map from facts published in the daily papers. Two days.

^{*}Given in detail.

- 13. Construction of a river profile, from source to outlet by the aid of topographic maps. Two days.
- 14. Construction of a profile around the earth at the equator showing ocean beds and continental areas. Two days.
- 15. Study of common minerals and rocks. The collections studied have been the Boston Natural History Society's collection, described in Crosby's Common Minerals and Rocks. cludes 25 of the commonest minerals and more than this number of the commonest rocks. This work will be extended to include the Washington School Collection No. 2 (40 minerals) and No. 3 (40 rocks). The latter excellent collections are put up by E. E. Howell, Washington, D. C. This study has included the identification of the minerals and rocks in these collections by means of their physical characteristics. This work could be extended indefinitely by including the blow-pipe characteristics. think the aim should be to teach the student to identify the more common rocks and minerals at sight in the field. book referred to above as text-book during this portion of the work and give about six weeks' study to it.
 - 16. Detailed study in the field of a miniature river valley, with measurements of width, length, number of turns, branches; directions taken with compass and notes made of the same. One day.
 - 17. Construction of a topographic map of the valley surveyed above (16), on a scale of 50 ft. = 1 inch with contour lines at 5 ft. intervals. One day.
 - 18. Study of typical topographic features with their various modified forms by means of selected sheets of the various government and state surveys. The accompanying descriptions posted on the back of the sheets were taken from "The Use of Governmental Maps in Schools," published by H. Holt & Co. Eight days.
 - 19. Excursions to several points of interest including a sand bank of glacial origin, a sand dune, a limestone quarry.
 - 20. Several stereopticon exhibitions of pictures illustrating (a) facts of astronomy and the earth's relations as a planet and (b) typical physiographic features. Slides for the latter illustrations were chiefly those in the list prepared by Professor W. M. Davis for the use of Cambridge grammar schools.

- II. Library Exercises and Class Discussions.
- 1. How do we know that the earth is spherical?
- 2. What relation is there between the altitude of the observer above sea level and the distance of the horizon?
- 3. What reason have we for thinking that the earth probably rotates on its axis?
 - 4. What actual proofs have we of the earth's rotation.
- 5. In discussing the problem of the earth's revolution around the sun, what facts are to be explained?
- 6. What are (1) the probable reasons and (2) the actual proofs of the earth's revolution around the sun?
- 7. What is the "front" of the earth and when are we "in front?" Note that the "front" of a carriage is that part toward the horses.
- 8. How do we tell (a) latitude and (b) longitude by observation, at sea, for example?
- 9. What are the phenomena connected with the (a) sun's rising, (b) meridian position and (c) setting seen by a dweller at the equator throughout the year?
- 10. What is the sun's position at noon at the solstices and at the equinoxes to an observer at (a) the Tropic of Cancer and (b) the Arctic circle?
- 11. What are the phenomena connected with the sun's appearance and disappearance through the year to a dweller at the North pole?
- 12. Travellers go to northern Scandinavia to see the midnight sun. (a) Where are they first able to see this phenomenon, and (b) when they see it, where in the heavens is the sun located?
- 13. Is there any time of year when (a) the sun is on the east point of the horizon at sunrise to all places on the earth's surface, and (b) when daytime (the time of the sun's shining) is 12 hours long at all places on the earth?
- 14. What effect on climate would result if the earth's axis were (a) at right angles to the plane of its orbit; (b) in the plane of its orbit, and (c) inclined 45° to the plane of its orbit?
- 15. What planets have nearly the conditions described in a, b and c, question 14, above?
 - 16. What becomes of the water that falls as rain?

- 17. What is a barometric gradient?
- 18. Why do some deep fresh-water lakes seldom freeze?
- 19. The origin, function and "death" of lakes.
- *20. The facts concerning existing glaciers and the evidences of past glaciaion.

I will now give the detailed directions which have been given to the students in the case of several of the exercises already mentioned. These may serve as types of the directions which have been given for all.

Exercise.—Preliminary study of a topographic map.

Apparatus Needed.—Sheets of the U. S. Geological Survey topographic maps of of the State surveys of New Jersey or Massachusetts or Connecticut. Enough maps should be provided to furnish one sheet to each pupil or group of two. Coördinate paper, ruled in inches and tenths, strips 15 inches by 4 inches. Colored pencils.

Method.—The following questions are to be answered in the note book, and the profile, when completed, is to be stuck in with mucilage.

- I.—1. (a) By what state or government survey and under whose direction was your map executed? (b) The name of the sheet you have and (c) what is its scale in miles per inch?
- 2. Find on the large map of the United States or of the state the location of the sheet you have, and make in your note book a sketch map of the state and show by lines the location of your sheet.
- 3. The most noticeable thing on the map is the purple or brown lines called *contour* lines. (a) What do they mean? At the bottom of the map notice this statement, "contour interval 20 ft." (b) What does this mean?
- 4. Notice (a) the crooked blue lines, (b) the black lines which are always in pairs and parallel, (c) the heavy black lines which are crossed by bars, (d) the rectangular black spots. What does each mean?
- 5. Explain the meaning of each of the following arrangements of the contour lines, and give the location of a spot on the map which illustrates the arrangement; (a) close together, (b) few in

^{*}Given in detail later.

number and far apart, (c) in circular rings, (d) parallel for considerable distances and in considerable numbers, (e) evenly spaced whether circular or parallel.

- 6. Find (a) the elevation of the highest spot on the map and (b) of the lowest spot. The latter can be found usually by finding where a river leaves the border of the sheet. What (c) is the difference in elevation between these two spots and (d) how far apart are they? (e) Do you think one could be seen from the other?
- 7. Examine the map and determine whether the other high points come near to the highest in altitude. Find the difference in altitude between several high points and the highest point, and tell how far these lower peaks are from the highest peak.
- II.—8. Determine the best bicycle road between two selected places, and determine the distance by road between them. Distance and grade must both be considered in answering this question. The quality of the road cannot be told from the map. Describe briefly the route selected in your note book.
- 9. Connect two places by an imaginary straight line as long as your coördinate paper will allow. This line should cross some high points and, if possible, some valley. Determine upon a suitable vertical scale and construct a profile along the line between the two points. The horizontal scale here may be on the profile as on the map. 1 mile = 1 inch, nearly. This makes the work quite easy. You construct this profile by locating on the coördinate paper points corresponding to the elevation of the contour lines along the imaginary line connecting the two places. How many times is your vertical scale exaggerated as compared with the horizontal scale?
- 10. On the same piece of paper, and near the top of it, construct another profile whose vertical scale shall be 5,000 feet = 1 inch and horizontal scale as before in question 10. Compare these two profiles. The last one drawn is nearly true to nature since the vertical and horizontal scales are nearly the same. What do these two profiles tell us as to the method of showing relief in profile or on a map.
- III.—11. Take your position on some high point of medium elevation and determine the limits of your vision in all directions. Describe the "view" in your note book.

- 12. Name all the principal rivers and lakes found on your map.
- 13. Find the altitude of the principal lakes and the amount of fall of the rivers. Note particularly whether your map contains the source of any large river.
- 14. Color brown or black the area below the contour line in the first profile you constructed (9) and write on the profile the names of the principal places passed through by the line. Indicate lakes and rivers crossed by blue. When your profile has been accepted paste it in note book.

Remarks: The aim of this exercise is to teach the student to read a topographic map and to help him to see what there is on it. Later this knowledge is made use of when we come to study topographic forms and their method of development. At a later exercise many different topographic maps will be shown the student and he will be asked to describe them, not in the minute way undertaken here, but with reference to the physiographic forms which they illustrate. There is work enough in the questions above for three laboratory exercises of two hours each. The Roman numerals may indicate about how much can be done each day. In selecting sheets those representing mountain and valley conditions of moderate relief should be chosen. The Berkshire hills and northern New Jersey furnish good subjects for study.

(To be continued.)

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GEOGRAPHICAL AIDS (II.).

VOLCANOES.

One of the phenomena of the earth concerning which there is always much said, and oftentimes badly said, in the teaching of geography is that of vulcanism, including volcanoes, earthquakes, etc. In most cases volcanoes are treated from the awe-inspiring and destructive side rather than in a common sense and rational way, in reference to their relation to each other and to the history of the country in which they are found. I well remember how, in

my earlier geographical studies, I was told that volcanoes were direct proof that the center of the earth was in a "state of igneous fusion." I had but little idea of the volcano and still less of the meaning of the words "igneous fusion."

In order that the teachers of modern geography who are readers of this JOURNAL may be helped a bit in regard to volcanic phenomena, a few suggestions regarding volcanoes and earthquakes are here presented, together with some helpful references that will give a better understanding of the features themselves. Among the questions that have to be presented to the pupil are: What is a volcano? How does it look? Where do volcanoes occur? What are some of their effects? Are there any volcanoes in the United States? What are some of the effects of earthquakes? What relation is there between volcanic features and history, etc.? One of the best descriptions of the features of a volcano is an account of a small eruption of our typical volcano Vesuvius, and of its effects upon history as seen in Pompeii and Herculaneum, given in the book called "The Aspects of the Earth," written by N. S. Shaler and published by Scribners. Another good description, well illustrated, in which the features of Vesuvius and the Hawaian volcanoes are well brought out, is to be found in Chapters X. and XI. of Heilprin's "The Earth and Its Story," published by Silver, Burdette & Co. These chapters also give something of an idea of the life history of volcanoes, speak of their causes, their distribution and effects, and give something of the effects of earthquakes.

A very good map showing the distribution of volcanoes is to be found in Plate 27 of Tarr's "Elementary Physical Geography," published by The Macmillan Co. A smaller map, but a helpful one, is found in Werner's "Grammar School Geography." Another book which gives a good map of the distribution of volcanoes and something of the distribution of earthquakes is Mill's "Realm of Nature," page 90, published by Scribners. A statement regarding the distribution of volcanoes is given in a very readable chapter on mountains in "The Beauties of Nature" by Sir John Lubbock, published by The Macmillan Co. The following paragraph on page 244 of that book may assist those who have no access to a ready-made map:

"A glance at the map shows that volcanoes are almost always situated on, or near, the sea coast. From the interior of continents they are entirely wanting. The number of active volcanoes in the Andes, contrasted with their absence in the Alps and Ourals, the Himalayas, and Central Asian chains, is very striking. Indeed, the Pacific ocean is encircled, as Ritter has pointed out, by a ring of fire. Beginning with New Zealand, we have the volcanoes of Tongariro, Whakaii, etc.; thence the circle passes through the Fiji islands, Solomon islands, New Guinea, Timor, Flores, Sumbava, Lombock, Java, Sumatra, the Philippines, Japan, the Aleutian islands, along the Rocky mountains, Mexico, Peru and Chili, to Tierra del Fuego, and, in the far south, to the two great volcanoes of Erebus and Terror on Victoria Land."

A consideration of the volcanoes of the United States is best introduced perhaps by the article in the National Geographic Monographs, published by the American Book Co., entitled "Mt. Shasta, A Typical Volcano," by J. S. Diller. This article gives the history of the youngest volcano of the Cascades and something of the relations of glaciers, vegetation, etc., thereto. The same author has given us a very valuable article concerning the evidences of extinct volcanoes entitled "Crater Lake," in the National Geographic Magazine for February, 1897, beginning with page 33. This magazine is published in Washington, D. C. A book by Prof. I. C. Russell, entitled, "The Volcanoes of North America," is soon to appear from the press of The Macmillan Co. If this book is at all like its predecessors on The Lakes and Glaciers of North America, published by Ginn & Co., from the pen of the same author, it will be a very valuable addition to the literature concerning the volcanic phenomena in our native country.

The life history of a volcano and some of the signs of ancient vulcanism are well given from the teacher's standpoint on page 15 of Frye's Complete Geography, published by Ginn & Co. Some of the striking features of our great American volcano, Cotapaxi, are described in that extremely fascinating book by Edward Whymper, entitled, "Travels Amongst the Great Andes of the Equator."

The effects of earthquakes and the phenomena of earthquakes

are interestingly described by Professor Shaler, in his book, "The Aspects of the Earth" above referred to. A careful account of the recent greatest earthquake shocks in the United States is given by Captain C. E. Dutton, in the 9th Annual Report of the United States Geological Survey, which should be in all large libraries.

The writer has not attempted to bring together here a complete bibliography of volcanoes and has omitted reference to some of the striking volcanic phenomena of this country. It is hoped, however, that the suggestions given may be of value. All the books mentioned, with the exception of the distinctly school books, should be in every reference library, not only because they are scientific and accurate, but because they are more capable of popular use than any other books on the same phenomena with which the writer is familiar.

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NOTES.

The Western Sahara.—The following notes about the Western Sahara are taken from a very interesting account of Cape Juby in the Scottish Geographical Magazine for March, 1897.

"By ancient geographers, the Sahara, which covers an area of 3,000,000 square miles between the Nile and the Atlas mountains, was supposed to be a vast plain of moving sand more terrible to encounter than the waves of the ocean, on which cases were scattered here and there like islands. It is now, however, becoming generally known that the Sahara is not entirely a desert, or everywhere flat. It is, on the contrary, traversed by mountain ranges, reaching at Asben a height of 5,000 feet above sea-level (Timge). It contains verdant valleys, in many of which there are groves of trees, and it is inhabited by a large population divided into several tribes or confederations, who have erected towns and engage in various branches of industry.

The country which we are now concerned with is the western Sahara, stretching from the Ahaggar mountains and Adrar on the east to the Atlantic, and from the Atlas down to the Senegal. It

is divided into several districts, each governed by an independent chief, the most important being Azawad, Adarar, El Haha and El Hodh. Its population is estimated at over 2,000,000. Opposite the Canary islands, in lat. 27° 56′ 41″ N. and long. 12° 56′ 10″ W. is situated Cape Juby, and from this point the coast trends northwestward up to the Wad Draa, while to Cape Bojador it follows a nearly southerly direction.

The Wad Draa, the largest river of northwest Africa, is formed by the union of the Idermi and Dads, two small streams which rise in the Atlas mountains to the north of Tafilet. It flows southward into the Sahara and then makes a bend to the west, entering the Atlantic about 100 miles to the north of Cape Juby. Its valley is very fertile and the inhabitants grow large quantities of barley and other cereals, dates, vegetables and fruits.

From the Wad Draa southwards there is no natural feature of any interest until the Boca Grande is reached, where the Shebika enters the sea, a river about 1,000 feet broad. About 80 miles farther is Porto Cansado, formerly occupied by the Spaniards. Here is an old castle, with loopholed walls six feet thick. The mouth of the harbor is silted up and a tremendous surf breaks upon the shore. Porto Cansado is about forty miles from Cape Juby.

About 10 miles south of Cape Juby is situated the Sakiet el Hamra, or Red Channel. During ten months in the year its delta is shut off from the sea by sand-dunes, but in the rainy season the water finds its way through the sand by numerous runnels. some the Sakiet is said to rise in the Hamada, or high tableland, while others affirm that it is an arm of the Draa. It runs in a bed 60 or 70 feet wide through a valley two or three miles in Here the tribes find good pasturage for their flocks and cultivate a few fields of barley. Some palm trees are visible in the background. The climate of Cape Juby is salubrious. the northwest coast of Africa the excessive heat of the Sahara is modified by the cool northeast trade winds, which prevail during eight months out of the twelve. The air is pure, dry and clear, and the weather is not subject to sudden changes. The soil being dry, vegetable fermentation proceeds less rapidly than in many other places in the same latitude, hence the diseases of hot ma-

larious districts, such as dysentery, intermittent and black-water fevers, are unknown, and during the twelve years Cape Juby was occupied by Europeans no case of fever occurred.

These favorable conditions of atmosphere and soil render Cape Juby a beneficial resort for patients suffering from lung diseases and rheumatic complaints. The climate is, indeed, very similar to that of the Canary islands. The shade temperature rises above 80° F. only when the *Harmattan*, the hot wind from the desert, is blowing. This wind blows two or three days at a time, and makes the atmosphere hazy. Meteorological observations taken at the castle, in connection with the Royal Meteorological Society, show that the difference between the summer and winter temperature is small, and in this respect Cape Juby compares favorably with Madeira and the Canary islands.

The dew at night is heavy, and at dawn the country is as wet as though a shower of rain had just fallen. The rainy quarter is the southwest and, though rain sometimes falls when the wind near the earth blows from the northeast, the clouds are even then seen to be moving from the former direction. The mean range of atmospheric pressure is 0.694 inch. The barometer falls for southeast and southwest winds and rises for west, north and northwest winds. For eight months in the year the wind blows from the northeast. In November and February it is more variable, but even then the northeast and northeast by north are the prevailing directions. Fogs and mists are rare and not of long duration, generally occurring in the morning and vanishing in the Thunder storms are also rare, but sheet lightning is seen from October to April.

The vegetation consists of large, compact bushes, cactus and other thorny succulent plants, which serve as forage for camels. Here also grow Anafis, the bark of which is used for tanning; henna, the shrub which yields the dye used by the native women to color their foreheads, noses and finger-nails; and orchilla, a parasitic plant, which also furnishes a beautiful dye. Some of these bushes grow as high as six to ten feet.

The rainfall in the Sahara is very small and irregularly distributed. I measured the fall at Cape Juby in 1894, and found it to be only three inches for the whole year. The supply of water

is supplemented by the wads or rivers flowing down from the mountains, which furrow the surface in many directions. Though none of them now contain water all the year round, their beds rival in breadth the great rivers Europe, thus indicating that in former times more favorable climatic conditions produced magnificent waterways.

The subsoil water is still remarkably abundant, and, especially near high land, is easily reached by sinking wells. The depth at which it is found varies according as the nature of the soil is favorable to infiltration or not. In the neighborhood of Cape Juby it lay from three to ten feet below the surface. It was brackish, but the natives drank it freely, and the flocks of sheep and the camels were supplied from wells.

Even the sand is not absolutely destitute of fertility. In Arabia I cultivated cucumbers on a plot of sandy soil with most satisfactory results; these plants subsist, of course, to a large extent on water, and mine were watered four times a day. Thus water is the great essential to fertility; reduce the rainfall by a few inches and the country becomes a steppe, which by the loss of a few inches more is transformed into a desert.

All around Cape Juby are what are called sebekh (plural of sebkha), which are depressions containing crystallized salt. To the southeast, 15 miles from Cape Juby, lies one called Sebka el Hamra about 400 yards long by 200 broad. On a journey to this sebkha we experienced the well-known illusion called mirage, imagining we saw a lake of bluish water. Wild boars were seen crossing the sebkha, and on our return journey we fell in with a heard of gazelles, and one of our party, going in pursuit of them, was lost and did not turn up again until the following day.

The salt pans of Taudeni and El Juf are very extensive, and have been worked for the last five hundred years. The salt is deposited in five different layers, of which the uppermost is almost worthless, while the fourth is the most valuable; the lowest is steeped in brine. It is quarried out in slabs, some as much as 3 feet long, 13 inches broad, and 3 inches thick, weighing 65 pounds each. They are sold in Timbuktu at the rate of 1 sterling per cwt. In El Juf there is a whole series of salt pans, one of which is about 30 miles long by 12 broad; 20,000 camel-loads of salt are extracted from it annually.

The domestic animals of the western Sahara are camels, sheep, goats, horses, donkeys and cattle; gazelles, antelopes, wolves, hyænas, ostriches, foxes, fennecs, jackals, wild boars and leopards are the game. Here, as elsewhere, a harmony exists between the fauna and the soil. The camels, sheep and reptiles have the yellowish hue of the sand—the result of natural selection. necessity of covering long distances in search of pasture has produced great length of limb; even the sheep have longer legs than those in this country. Perhaps the most distinctive feature is the ability to go a long time without water, which all the animals possess, and the camel in a marked degree. He can travel six to ten days without water, feeding on the acacia and other thorny bushes, and, at the end of this time, can drink more than one hundred pints of water. The camel of the Sahara is the dromedary, with one hump. To the natives this animal is indispensable; it carries them from place to place and supplies them with meat and milk. Many natives live upon camels' milk alone for nine months out of the twelve. A she-camel yields milk for ten months, supporting one person besides her own foal. Thus, if a man owns, say, three she-camels, he can wander about at will without the necessity of seeking food for his family. The ostrich also is peculiarly adapted for the desert; it feeds on the tops of certain shrubs and can live a long time without drinking. The gazelle is valued for its flesh, and its skin is tanned and manufactured into various useful articles.

Her Majesty's Consul at Mogador writes in his report: "The akabar or caravan from Morocco, is the largest that crosses the desert to Timbuktu. It starts once a year, about the month of October, from Tinduf on the confines of the desert, and amounts to over 10,000 camels. Only 20 per cent. leave that station laden with goods; the others proceed to Taudeni, in the center of the desert, where they are laden with salt for the Sudan. There are, besides, many small akabars which cross the desert during the year, averaging 100 camels each. The merchandise carried by these caravans, consists of the following goods: Blue cloth, American cloth, long cloth, sugar, tea, glass beads, amber beads, shells and silk, from Fez and Morocco; gold, ostrich feathers, Senegal gum, gum-Arabic, frankincense, blankets, and slaves from the Sudan.

"The average value of the merchandise carried by each camel is £50. The approximate value, therefore, of the goods conveyed by the great akabar is £100,000; add to this sum £30,000, the value of the small caravans, and the total value of the merchandise sent yearly from Morocco to Timbuktu is £130,000. Upon this sum a profit of 75 per cent. is made by the traders, besides the gains on the salt carried from Taudeni to Timbuktu. 60 per cent. of the camels are sold at that place, as comparatively few are required for the returning with the light Sudan goods. At Timbuktu the great caravan is broken up, and the traders return in small parties to their respective homes by different routes."

R. E. D.

Slavery in Africa.—Slavery has been abolished in the British Niger country, the decree to take effect on the completion of Queen Victoria's sixty years reign. Also, through the influence of the British, the Sultan of Zanzibar has abolished slavery except in the case of concubines. The Government will pay compensation for all slaves legally owned.

R. E. D.

Districts in Tropical Africa Where White Men May Live and Work.—Tropical Africa, having been explored in broad outline, one of the interesting questions now being studied relates to the regions where the enterprises of white men may be carried on under favorable conditions. Captain B. L. Schlater, who is building a road through the British East Africa Protectorate to Victoria Nyanza, in advance of the railroad now constructing, speaks of the floor of the great Rift valley, the longitudinal depression dividing the Mount Kenia uplands from the Mau and other plateaus to the west, as most excellent grazing ground, and he believes ranching may be successfully carried on there. The Mau and Nandi plateaus enjoy a perfect climate, and malaria is unknown above 7,000 feet. They are watered by numerous perennial streams in deep wooded valleys. In Nandi the cattle and sheep are the finest in East Africa. Sir John Kirk maintained (Sixth International Geog. Cong., London, 1895) that "we may dismiss as useless, for the purpose of real colonization, the whole of the maritime zones on both coasts of Africa, together with all lands in Tropical Africa below a general level of 5,000 feet."—Bull. Am. Geog. Soc., XXIX., 1, 74.

Animals of Japan.—This is a land without domestic animals. It is this lack which strikes the stranger so forcibly in looking upon Japanese landscapes. There are no cows; the Japanese neither drink milk nor eat meat. There are but few horses, and these are imported mainly for the use of the foreigners. The freight carts in the streets are pulled and pushed by coolies, and the pleasure carriages are drawn by men. There are but few dogs. There are no sheep, as wool is not used in clothing, silk and cotton being the staples. There are no pigs; pork is an unknown article of diet, and lard is not used in cooking. There are no goats or mules or donkeys.—The Medical Missionary, March, 1897.

Crossing the Andes.—A railroad takes the traveller across the flat, plains of Argentina. From Mendoza the traveller ascends 7,000 feet in the first hundred miles to Puente de las Vacas. whence there is a coach road to Las Cuevas—the base of the summit. "The Cumbré or summit is twenty-five miles away. be crossed before noon, for as a rule a gale springs up soon afterwards-dangerous to man and beast threading a narrow path overhanging precipices five miles deep. * * * The Cumbré is in front of you. There is just room for the mule. Trust to him you must. Look straight ahead and hope it will be well. You are already 14,000 feet up. There is not a living thing to be seenno birds, no trees. Distances are nothing. That mountain—the peak of Tupungato-twenty miles distant, does not appear to be two away. But once at the top of the Cumbré, what a glorious sight-worth all the danger, all the fatigue." The descent into Chile is far worse, and more trying to the nerves than the ascent. The railroad which is planned to pierce the solid mountain with a tunnel seven miles long is making but slow progress. Government aid is essential and that is not forthcoming.—Scot. Geog. Mag., Vol. XIII., p. 195. H. B. K.

Russian Industries.—"In connection with the exhibition held last year at Nizhni-Novgorod, some details are given in the Bull. de la Soc. Geogr. Comm. de Paris, No. 6, 1896, of the natural and artificial products of Russia. Agriculture and its dependent industries employ 80 to 100 millions of the inhabitants of Russia.

The wheat crop of 1895, represented in the exhibition by a coffer on the scale of one to a million, was 40,305,000 tons. In the Ural mountains there are 108 smelting houses, and during the past thirteen years the mining industry in Russia has made great In 1895 nearly 7½ million tons of coal were extracted, while in 1860 the quantity was only 290,000 tons. The production of petroleum has increased from 329,000 tons in 1880 to over 5½ millions in 1895. Gold mining is making a fresh start, and more perfect processes are being employed. The yield in 1895 was 103,998 lbs. troy, valued at £5,287,880. The production of copper has been doubled since 1882-in the Caucasus, where electricity has been employed, it has been trebled. Mercury, which did not appear in the Moscow exhibition of 1882, is now exported from the steppes in considerable quantities. Iron founding has made gigantic strides, partly through the introduction of foreign capital. The metal is now worked in 180 factories in different parts of Russia, and the production of the whole empire, including Siberia and Finland, now amounts to more than 1,431 thousand tons of steel. The total export of iron in all forms, including machines, etc., is fully 360 thousand tons, while the iron used annually in Russia itself is a little more than 4½ cwt. per inhabitant. A comparison of the figures for the last three years shows that the home industry has progressed at the expense of importation.

"In other industries, also, great progress has been made since 1882. In cotton spinning Russia occupies the third place, after Great Britain and the United States. Not only is the home demand supplied, but goods are manufactured for exportation to the east. New methods have been introduced, and fine threads are now manufactured. Equally flourishing are the wool manufactures."—Scot. Geog. Mag., Feb., 1897.

The Life of an Island.—Falcon island in the Friendly (Tonga) islands (20° 20′ S. lat.; 175° 20′ W. long.) was first noted as a shoal in 1867. In 1877 smoke was seen ascending from the sea surface over the shoal. In October, 1885, an island had been formed 3,700 meters long and 75 meters high. At this time a terrific eruption was in progress, enormous clouds of constantly

changing form rising over the island; earthquakes were felt on the neighboring islands and thundering sounds were heard on the southermost island of the Fiji group, 325 kilometers away. In 1886 the island was estimated at 2,600 meters long and 50 meters high; in 1887 the height was 90 meters. In 1889 the length and breadth were 2,040 and 1,630 meters; the height was 47 meters. The adjacent sea bottom was 1,800 meters deep. The island consisted of ashes and has subsequently been greatly reduced by wave action. In 1892 its height was only eight meters, and its disappearance may soon be expected.—Science, May 21, 1897.

Ireland.—The largest bog in Ireland is the bog of Allen, which stretches across the center of the island, east of the Shannon, and covers nearly 250,000 acres. Altogether there are nearly 8,000,000 acres of bog in Ireland, that is to say, about one-seventh of the total area of the country is bog.—Evening Post.

The Beginnings of Geography.—Professor Henry McCormick, of the Illinois Normal University, is contributing a series of helpful articles on "The Beginnings of Geography" to the Public School Journal. The article in the May number is especially suggestive to a teacher who would use the bond of relationship by commerce in going from a study of home conditions to a study of conditions abroad. The article deals with the geographical aspects of mining, manufacturing, agriculture, etc., and of the post office, telephone, telegraph and railroads as geographic aids. cases the ideas as outlined could be given to pupils of a younger age than those mentioned. Let each teacher get the ideas as her own, however, and apply them whenever she best can, for the decision of the proper place in the curriculum of this or that idea must depend upon the ability of the teacher to make the best use of the matter at the stage of advance selected. R. E. D.

EDITORIAL.

A COURSE in a good summer school is one of the best investments for a teacher, if her health allows, for there she can get new deas and come in contact with new people among pupils and teach-To those teachers who seek new light in geography, many summer opportunities are open, as for instance at the National Summer School at Glen Falls, N. Y., at the Harvard Summer School at Cambridge, Mass., and at the Marthas Vineyard Summer Institute at Cottage City, Mass. At these three schools some of the leading teachers and students of geography of the east will conduct classes. Here, as well as at some other places, will be found opportunities to concentrate attention on one or a few subiects. Such a place allows the pupil to get more than a superficial knowledge and usually produces a more lasting and useful effect than the plan of attending short courses or isolated lectures on many subjects. In the latter case there is no time between courses to digest materials received in the earlier lectures of the day, and mental indigestion very frequently results. Those teachers who prefer to scatter their energies rather than concentrate them will find summer schools where they can gain much in geography but where there is usually no pretense to do anything more than try to throw out a few suggestions for improvement in method, based on knowledge already acquired or presumed to be acquired. The method courses may produce imitative teachers, whereas the more complete courses may produce independent and more thoughtful In either case something is gained if it be but an outing. Surely the travel to the school and home again will give a glimpse of new country that should be of vast help to any teacher.

If you cannot get new ideas and new friends from summer schools, or summer institutes, however brief, we hope that you can renew your acquaintance with or be introduced to Nature herself, and learn your geography first hand from the open book of the rocks and hills. This book is more readable however, if the alphabet of understanding be first studied under the lead of a master. The summer should be the season of geographic growth and the editors trust that every teacher who can, will make some effort to help along the cause of better geography teaching, by acquiring new facts, new principles and new illustrations to enrich the work of the year to come.

REVIEW.

Glaciers of North America: A Reading Lesson for Students of Geography and Geology. By I. C. Russell. Ginn & Co., 1897. Pp. x+210.

We would recommend most heartily to those of our readers who wish to become familiar with some of the striking features of our continent, this reader on the Glaciers of North America, by Professor Russell. It is a companion volume to his previous book on the Lakes of North America, and to the one promised for the near future on the Volcanoes. It describes first the features of glaciers, whereby we may know from their results their former distribution; and then takes up in detail the distribution of the glaciers of North America, of the Sierra Nevada, of Northern California, of Canada, of Alaska, and of Greenland. The later chapters discuss the present opinions among scientists regarding certain theoretical considerations. The last chapter on the Life History of the Glacier is extremely interesting and most suggestive. book contains a number of well-chosen illustrations and maps, and is extremely well planned for its purpose. It is simple, clear and direct, though not popular, and a very great addition to the publications which have already appeared along similar lines. who have had some training in geography higher than that gained in the grammar school this book will be most serviceable; it will be, however, a very great help to any one who will read it with care. We would refer the readers particularly to the chapters on the glaciers of Northern California and of Alaska. The author is personally familiar with nearly all the regions he describes, and particularly with the Alaskan glaciers in the vicinity of Mount St. Elias, and therefore speaks with authority and with that certainty which makes the reader feel confidence in him. The subject treated is in a way a small one in comparison to all the other features of the geography of our country, but it is an important one and an interesting one, and brings forth most clearly to the minds of all the fact, that it is not necessary to go to the more distant Alps to get illustrations of glaciers and their work. The book should be in the library of every well-ordered school, and the private property of every one who is interested in the natural features of our country. R. E. D.



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THE VALLEY OF THE AMAZON AND ITS DEVELOPMENT.

So intimately is the welfare of man bound up with the geographical features of the world which he inhabits that the ultimate aim of the study of any portion of the earth becomes of necessity economical. The two great questions then which must be answered concerning the valley of the Amazon, as of any other river basin, are, what useful products may it furnish to the markets of the world, and what advantages or difficulties does it present for the development of industry and commerce.

As frequently happens, the drainage basin is so much more extensive than the area commercially tributary to the navigable reaches of the main stream and its confluents, that the obstacles to the transportation of merchandise to the Atlantic Ocean from the elevated regions in the direction of the axis of the river system are greater than those in an opposite direction. Therefore, these elevated regions should be considered apart commercially from the flood plains. To present these matters properly, however, an examination of the physical features of the Amazonian valley is requisite.

In one sense it may be regarded as bi-partite, two vast river

systems inosculating in their lower portions, one the main Amazon, with a general direction from west to east, the other the Tocantíns, with a general direction from south to north. The latter empties into the well defined estuary known as the Rio do Pará, which also receives small contributions from the Amazon during certain seasons. The former, likewise, receives feeble additions, through the labyrinthine network of connecting furos, from the estuary of the Tocantíns. Geographers differ in their assignments of relationship between these two river systems, but little violence is done to the claims to individuality on the part of the Tocantíns by considering it as a part, but a very distinct part, of the Amazonian system.

A true delta does not exist, although the term is often applied to the insular masses between which the Amazon reaches the sea. These masses are in part river bars of vast extent, and in part original continental land, with ribs of rock still protruding above the general level. As a matter of fact, instead of the gradually widening flood plain, so characteristic of most great rivers, the Amazon is restricted in its lower course by hills of erosion to within a comparatively short distance of the sea, so that the coastal plain is relatively insignificant, considering the size of the continent, and the immensity of the fluvial system here finding escape from its basin. We have, in the case of the Amazon, an example of a river cutting through both of the great continental mountain rims, instead of having its course determined by them. Thus the ideal conditions for delta formation are absent, to which must be added the circumstance of debouching into a tidal sea on its western side, at a point where the recently bisected equatorial current is washing the coast with extraordinary force.

We have then to bear in mind that we are dealing with a double drainage basin, and that the flood plain is not developed as an expanding area toward the sea, and that a true delta is not in process of formation.

The flood plain, however, is of extraordinary size, lying within the interior continental depression. The length of the Amazon may be put at approximately 4,000 miles. Taking this figure then, it is a startling fact that the river develops its flood plain at the end of its first thousand miles, at the very point where

it bursts through the eastern Cordillera of the Andes, making the famous cataract known as the Pongo de Manseriche. Though there are reaches of considerable length between the mountain walls where slack water is found, these are determined by local elevated flood plains. This is true whether we accept the Rio Ucayali or the Rio Marañon, the two great branches toward the source of the Amazon, as being the main stream. The question as to which should be considered as the mother stream is of little practical moment, but the great Peruvian savant, Antonio Raimondi, may be credited with having settled the point by a simple test. He took many samples of the water above and below the junction of the Ucayali and Marañon at all seasons of the year, filtered these, and determined the quantity of salts in solution. found that under all circumstances the dissolved matter in the waters of the Marañon was in excess of that in the waters of the Ucayali, while the quantity in the waters of the full stream naturally coincided more closely with that in the Marañon. seemed to establish the supremacy of the Marañon. geological reasons leading to the same conclusion. The enormous corrasive effects of the Marañon not only exceed those of the Ucayali, but they seem to have been continuous throughout the period of the Andean uplift, cutting down through the eastern chain almost to sea level. No equal corrasion occurred on the upper Ucayali, thus indicating the greater antiquity of the Marañon.

The interior basin of the Amazon, which has an average elevation of about 400 feet above the sea, extends from the Serra do Almeyrim on the east to the Andes on the west, and from the Guiana and Venezuelan highlands on the north to the Matto Grosso uplift on the south, or approximately 700,000 square miles. This is all included in the flood plain of the main stream, neglecting the Tocantins, and is probably too small an estimate. The river has manifested no tendency to widen its flood plain by detouring, for it is to be observed that the effect of the centrifugal force of the earth is to make as nearly as possible a straight line of the Amazon, coinciding with the equator, and to hold it upon that line once it reaches it. Hills on the north side, which are being constantly worn away, are the only obstacles to the exact equatorial position of the Amazon to-day, and it is conspicuous

that as soon as the coast plain has been reached, where there are no further obstructions on the north side, the river assumes this position, its mouth being almost exactly bifurcated by the equator. The lateral expansion of the interior flood plain has been caused mainly by the tributaries, which are subject to the same laws of movement as those which have been so exhaustively studied in the case of the Mississippi.

Another striking feature of the Amazon is the large number of furos or side canals, which run approximately parallel to the river for hundreds of miles. With few exceptions these are confined to the south side of the stream, being evidently nothing more than former channels abandoned in its steady progress towards the equa-Bayous and abandoned channels along the tributaries are also found, but these are of far less gigantic proportions as to length than those which follow the Amazon proper. It will also be seen that the great estuary of the Pará extends westwardly, by a number of elongated lake-like expansions, almost to the junction of the Rio Xingú with the Amazon. Though not fully proven, it is almost certain that these indicate a former channel of the Amazon. when it emptied into the sea south of the huge island of Marajó. On this assumption the existence of the vast network of furos running north and south between the Rio do Pará and the lower Amazon can be easily explained as remaining vestiges of the northward movement of the great stream towards its normal equatorial position.

One more important feature of the Amazon remains to be noticed. This is the existence of what may be called the terrace basins, which are a peculiarity of its greater tributaries on both the north and south side of the valley. Following up either the Rio Madeira on the south or the Rio Negro on the north, a series of gigantic rapids occur at a distance of a few hundred miles from the Amazon. These rapids aggregate 40 or more miles in length in each case, the total descent being several hundred feet. Then an enormous plateau is found above the rapids in which the respective rivers have cut down to an elevated base level. Properly speaking, these belong in the curve of the terrain, for in the course of ages these rivers will have worked down and back from the edges of the plateaus, to the beginning of the upper terrain above

the plateaus. Here, again, lack of complete exploration, with respect particularly to the geology of the regions involved, introduces some uncertainty in the interpretation of the facts, but the evidence would seem to imply that the transverse South American uplifts were more recent than those parallel with the great oceans. Similar terrace basins occur on many other Amazonian tributaries below the junction of the Rio Javary, but less extensive as to area. The fact that they do not occur prominently west of the Javary is also significant as indicating the earlier and perhaps more gradual upheaval of the Andes, the eastern cordillera apparently being the oldest.

In another important respect the Amazonian basin is peculiar. It is divisible into an equatorial belt of nearly uniform annual precipitation, and of flanking areas, north and south, of variable precipitation. Thus, in spite of the enormous floods, which are conspicuous to every traveller, the Amazon is subject to far less serious fluctuations of level than any other great river in the world, in proportion to the volume of water discharged. The axial contributions being nearly constant, the variations are due to the change of seasons in its tributary basins. As the sun swings from one tropic to the other, the rainy period on one side is just ceasing as it begins on the other. Accordingly, the variations of stage in the tributaries are proportionately greater than in the main stream. The vast lowlands of the flood plain, of course, serve as an equalizer of floods in the Amazon, being all the more effective for this purpose from the fact that the entire interior basin is densely wooded.

The climate of the coastal plain and interior basin is remarkably equable. The temperature averages about 85° F. at 2 P. M. and about 76° F. at 6 A. M., these being the hours of maximum and minimum heat. The annual variation is apparently less than 8°, although exact data from a sufficiently wide area are wanting. The humidity, however, is excessive, varying between the limits of 60 per cent. and complete saturation. The trade winds are felt throughout the entire length of the valley from the sea to the Andes, and serve to freshen the atmosphere and render the climate more salubrious. The daily electrical storms are also efficient purifying agents. Notwithstanding these, the quantity of carbon dioxide in the atmosphere is large, and in some localities at a

distance from the main river is enormous, giving rise to the painful and dangerous disease of beri-beri. Malarial disorders are common upon the tributaries, but are not so frequent nor so dangerous along the windswept Amazon. Perfect acclimatization is probably impossible for persons of northern birth, without southern ancestry, except in individual cases. Persons having a normally rapid circulation of blood, with a correspondingly high average body temperature, are less liable to climatic disorders in this tropic valley than those having the opposite characteristics.

The products of the Amazon are so many that to name them would be to set forth a catalogue of dreary length. Predominant today is India rubber, the product mainly of the Syringa trees, (Hevea discolor, and H. brasiliensis), euphorbiaceous plants, having a height of about sixty feet, growing only in the low, highly heated basin, subject to periodical inundation. proper treatment these trees will produce several pounds of rubber each per annum for fifty years. Systematic cultivation is now an infant industry, but as the wild reserves become ruined by improvident tapping of the sap, rubber culture will grow in importance. Owing to the habits of the trees, only native-born workmen can ever perform the actual labor of the plantations with safety. From the upper Amazon, in addition to some rubber from the Heveas, a somewhat inferior grade is obtained from the Castilloa elastica, a tree belonging to the bread fruit family (Artocarpaceae). Castilloa is common throughout Central America, the north and west coasts of South America, and the West Indies, but the two species of Hevea named are peculiar to the Amazon, and produce the most highly esteemed rubber of commerce.

Sarsaparilla, copaiba balsam, cacao (from which the cocoa of commerce is made), Brazil nuts, and hides are the more important products of this valley next in order after rubber. Sugar cane is extensively raised for the manufacture of rum, which is all locally consumed. The prevailing low prices for sugar afford little inducement to its production here for export. Rice is also grown to some extent, and might easily become an article of Amazonian commerce. All the fruits of the tropics are found abundantly, and no region in the world yields choicer bananas and oranges. The agricultural possibilities of the Amazon are very great, but it

is doubtful if they can be developed except by native Indian labor under intelligent superintendence. The difficulties in the way of a successful prosecution of such enterprises are the same as those common to all well watered and well wooded southern countries, but in this case enhanced by the enormous growth of timber, most of which is of the hard, close-grained varieties. The value of the timber, however, would be very great if it could be delivered in the markets of the United States and Europe. The future development of the Amazonian valley, so far as it may be accomplished by internally acting forces, will then be either by a slow growth of small plantations, carved out of the forests by natives at the cost of much labor and long and patient waiting for returns, or on a larger scale by wealthy operators or corporations, on a systematic plan, utilizing the timber product during the process of clearing land, and employing native labor for all tasks involving exposure to the severities of heat and rain.

The building of highways and railroads in a country requiring such heavy and expensive foundations, and so many bridges, often of great length, will be impossible until a comparatively dense population shall have occupied the region, and even then the cost of these conveniences will be so great as to limit for many decades any considerable advance in this direction. Fortunately water courses are so abundant, ramifying through the flood plain in so intricate a network, that the needs of a large population may be served by water transportation. High industrial development, however, is impossible where slow water communication is not supplemented by rapid land conveyance. This at once limits the central Amazonian valley to agricultural pursuits for a long period, and also ties her commerce to the chief fluvial cities, Pará and Manáos, which are accessible by sea-going vessels.

It would be possible to enter the Amazonian valley from the north by a railroad, coming across the Guiana highlands, which in part consist of open savannas, reaching the city of Manáos near the junction of the Rio Negro with the Amazon. Such a line would be about 750 miles in length, and would, in addition to opening up large areas of highland suitable for European colonization, save 1,250 miles of the journey from the center of the Amazonian basin to either New York or Liverpool. In time such a

road will be regarded as a necessity, and will result in partially conquering the valley of the Amazon by colonization working downward from the north. The persistent tendency of Brazilian railroad extension westward towards its natural goal at Cuyabá, the head of navigation on the Paraguayan river system, may result in a similar subjugation of a part of the great valley to productive industry by northward expansion from the salubrious Matto Grosso highlands. This development is already becoming realized by extensions of the industrial zone of Sao Paulo and Minas Geraes into Goyaz and down the Araguaya and Tocantíns. The determination of the Peruvians to unite the west coast with their eastern fluvial system by rail communication will produce a like result in the west, and evidences are increasing that a Bolivian industrial encroachment will manifest itself within the present decade. this way the more material development of the resources of the Amazon, by forces working from the periphery, will probably be brought about. Thus an interchange of commodities between the elevated and the low-lying portions of the valley will be rendered feasible, giving to the valley as a whole greater commercial unity which will be an element of strength, leading to a permanent prosperity that could never be securely established while the conditions of trade prevented any considerable diversity of production. COURTENAY DE KALB.

SCHOOL OF MINES, University of Missouri, Rolla, Mo.

TOPOGRAPHIC MAPS OF THE UNITED STATES.

Until very recently, there has been no formal provision for the distribution or sale of the topographic maps prepared by the United States Geological Survey and concerning which reference has several times been made in this JOURNAL. The maps have been used by geologists in the progress of their field studies; have been deposited in libraries and various public offices, and a certain number distributed to individuals having particular interests in the mapped areas. In 1894, the Director of the Survey authorized the statement that map sheets would be issued gratis to teachers and other school authorities "for use in teaching geography in

the schools," to the fullest extent which the appropriation for printing the sheets would allow. This, however, proved inadequate and unsatisfactory, and is now supplanted by a Congressional enactment, approved February 18, 1897, under which the maps must be disposed of by sale. A great fund of most useful material is thus brought within the reach of our public schools; yet to-day the schools as a whole are ignorant of their opportunity. To make known just such an opportunity as this is a reason for the existence of the Journal of School Geography. The following paragraphs describe briefly the style of the map sheets, the quality of the facts that they set forth, and the manner of ordering them:

Style of the Maps.—Each map sheet is designated by the name of some town or natural features within the limits of its "quadrangle," followed by the name of the state or states within Thus we have the sheet for Syracuse, N. Y., or for which it lies. Ottawa, Ill. The sheets are of uniform size, 16½ by 20 inches, but the scales vary in different parts of the country. An inch to a mile (about), or 1:62,500, being adopted for the most thickly settled districts; two inches to a mile, or 1:125,000, for less thickly settled districts, and four inches to a mile, or 1:250,000, for the least occupied regions. All topographic sheets are printed in three colors. The topographic form, or relief, is indicated by brown contour lines, whose vertical interval varies according to the scale of the map and the quality of the district. Twenty-foot contours are common in the inch-to-a-mile maps of the northeastern states. All water, running or standing, is printed in blue. artificial features, such as parallels and meridians, boundaries, roads, villages, cities and names, are printed in black. Thus carefully prepared, the maps have a delicate and pleasing appearance. It is only to be regretted that in some cases the elegance of the contour lines gives an indication of accuracy not altogether justified.

Quality of the Facts Represented.—There are certain natural features of our country whose names are very familiar to us, although the details of their form may not be clearly apprehended. For example, the Allegheny mountains of Pennsylvania; every boy and girl in our schools knows where they are; but how many know

what they are. Under the name of "mountains," it might reasonably be imagined that here, as in other mountainous regions, we should find a complicated grouping of peaks and spurs between larger and smaller valleys. As a matter of fact, the Allegheny ridges are long, even ridges, remarkably direct in their course and uniform in their height, for miles together. Seen at a distance to one side, they stand up like great walls, or gigantic railroad embankments, smoothly outlined against the sky. Peaks are practically unknown among them. The Harrisburg, Pa., sheet illustrates this quality of the Allegheny mountains to perfection. With this sheet before a class, the teacher may reasonably hope to portray the facts of nature, as a basis for the relation of earth and man.

The Allegheny plateau has long been known as a formidable barrier between the Atlantic coast settlements and the fertile plains and prairies of the Ohio valley. Look at the Charleston, W. Va., sheet, and see the labyrinth of branching valleys entering between the minutely dissected spurs of its uplands. Little need after seeing this map to say that the region is thinly settled, and must long remain so.

The northern border of the Allegheny plateau makes a strong escarpment overlooking the lowland of central New York. Examine the Oneida, N. Y., sheet, where the lowland rises a little above 400 feet elevation, while West Stockbridge hill, a spur of the escarpment, rises nearly a thousand feet higher, its strong northward slope frayed out by gnawing valleys.

The Mississippi flood plain is to-day a matter of public concern, as well as a name familiar to classes in geography. A small part of it is included in the Donaldsonville, Miss., sheet, on which one may see the slightly higher ground close along the river, and here the clustered houses; while at a distance to one or the other side are the "back swamps," where the flood water runs from crevasses in the levees at time of overflow. The famous Nita crevasse of March, 1890, is included on this sheet, and the effects of its overflow are clearly marked.

There is "no end" to examples of this kind, for over 900 sheets have now been printed, and new ones are coming from the press at the rate of forty or fifty a year. The great value of the

maps is that they give a definite picture to the eye, and to this a name may be properly attached by the memory. In the actual locality of some interesting physical feature, it may be known by sight much better than it can be known by map; but there is no chance for any of us to know all these important features by sight; we must make the best of our acquaintance with them through the maps. To teachers as well as to pupils, the facts of our national geography acquire new meaning when studied with these powerful aids. Teachers who are satisfied with recitations following the words of a text-book can doubtless get along without the maps very well; but those who wish to teach living truth must strive to introduce these aids and others.

Manner of Ordering Maps.—A notice issued by the Survey states that a list of the map sheets will be furnished, gratis, on application to the Director, U. S. Geological Survey, Washington, D. C. It is well to ask for two copies of the list: one copy may be marked to indicate the sheets desired: the other may be retained for future orders. Single map sheets, or any number under a hundred, will be sold at five cents per sheet. Orders for one hundred sheets or more, whether for the same or for different sheets, will be filled at the rate of two cents per sheet. Two dollars will therefore buy a hundred sheets; and a hundred sheets will furnish a large variety of most useful illustrations for class work. Four teachers can, by uniting, buy a hundred maps in a single order; each teacher will then have twenty-five maps, costing two cents apiece.

Payment must be made at the time of ordering, in money order payable to the Director of the U. S. Geological Survey, or in currency (at sender's risk) for the exact amount. Stamps and checks cannot be accepted.

Selection of Sheets.—Selection may be made on two grounds. The sheets of the home district are serviceable in aiding out-door teaching by promoting exploration and observation. Such sheets can be chosen from the printed list of published sheets, furnished by the Survey. The sheets of distant districts, on which important physical features are represented in whole or in part, are of even greater service from the close approach that they enable the teacher and scholar to make towards the facts of nature. There is at

cago Times-Herald of December 19, 1896. Pencils of different colors.

- Method. I.—1. Cut from the newspaper the portion of the column containing the meteorological facts reported from 63 different stations in the United States. With fine black lead pencil write the figures denoting "temperature at the time of observation" (8 P. M. of previous day) and "barometric pressure in inches" near the proper station on the map, placing the temperature just above and the pressure just below the spot denoting the place.
- 2. Isobars.—Draw first the line denoting the isobar of 30.00. This should be done by locating points which must afterward be connected by a red line. Stations whose pressure reading is above 30.00 will be on one side of this line and those whose reading is below 30.00 will be on the other side. Some attempt should be made to space the guiding points correctly; e. g., suppose two places have the readings 29.94 and 30.03 respectively. The point should be located twice as far from 29.94 as from 30.03. This line may be a circle or its ends may be free. It should not have sharp angles but should be a flowing curve.
- 3. The other isobars should then be drawn. They will denote differences of pressure of .10 of an inch. The "high" and "low" areas will thus appear and should be so marked.
- 4. Isotherms.—In a similar manner locate the isotherms beginning with the highest even temperature on the map. These isotherms denote temperature 10° apart and should be drawn in blue.
- II.—5. Weather.—Place around each station a small and represent the weather thus: ○, clear; ♠, partly cloudy; ♠, cloudy; ♠, snow; ♠, rain. Use black pencil.
- 6. Wind.—Draw arrows up to and beyond these circles to show wind directions; thus: # wind northeast. Arrows fly with the wind. These arrows should be black.
- 7. Rain.—Draw under each station which reported a measured amount of rain a green or yellow dash and under each which reported a "trace" a dot of the same color. Enclose all the places which have the yellow dashes by a light line. This line will pass through the yellow dots and enclose the yellow dashes. There

may be several of the areas on the map. Tint lightly with the yellow pencil the areas within the line. These show the areas of rainfall. The map is now complete. It is printed in blue and you have represented on it (a) isobars in red; (b) isotherms in blue; (c) weather conditions; (d) wind directions and (e) areas of rainfall. You should describe your map on its face by giving name, date, etc., and should paste your newspaper slip on the right hand side of the map. Answer these questions in your note book.

- 8. Compare your map with two others on the table one of which was made to represent the facts of the weather 12 hours before and the other 12 hours after your map and note the direction in which the "highs" and "lows" have moved. State this direction.
- 9. Do you notice the direction of winds indicated around the "high" and "low" areas? What appears to be this direction?
- 10. Can you predict what the weather is likely to be at Chicago, for example, with reference to winds, rain, clouds and temperature. Compare your prediction with the one given on the map.

Remarks.—The study of a weather map and the construction of a weather map are two quite different excercises. Each is valuable and both should be undertaken. The government map "form D" is very useful in this exercise. It gives just the places needed and no others. While other outline maps may be used and the places located by means of the atlas this latter plan makes the exercise a long and somewhat tedious one. "The Law of Storms" issued free by the U.S. Hydrographic office, Washington, D. C., a pamphlet of 16 pages with maps, may be read by the class at this point to supplement the discussion of the subject in the textbook. The teacher may require each student to get a copy of the paper on a designated day when the exercise is to be undertaken. The Washington weather maps, which may be had by application are supposed to be accessible. The teacher should work out this exercise and all others, for that matter, before undertaking it with the class. Probably any of the morning newspapers in our large cities contain the necessary information. Some do not however so that the teacher should investigate beforehand.

Library Exercise.

- A. Modern Glaciers.
- 1. Where are glaciers found?
- 2. What is their extent, in length, breadth and thickness?
- 3. What are the conditions of altitude, latitude and precipitation which are necessary to their formation?
 - 4. How are they formed? What is their structure?
- 5. How do they move, i. e., like a river or a board? What is their rate of motion? What resemblance between a glacier and a river?
 - 6. What does a glacier do to the valleys in which it moves?
- 7. What material does it transport and how does it get its material?
- 8. In what condition do glaciers leave the materials which they transport?
 - 9. What are moraines, terminal, medial, lateral?
- 10. What effects do streams that flow from glaciers produce on the valleys through which they flow? What would be the character of the material carried by such streams?
 - B. Past Glaciation.
- 11. What would you expect to find in a country that had been glaciated? Consider rock surfaces and deposits.
- 12. How would a continental glacier affect topography, i. e., stream courses, waterfalls, lakes, hills, valleys?
 - 13. What are "erratics," drumlins, eskers?
 - 14. What are "Kettle holes," "pot holes?"
- 15. Where is the border of the glaciated region of the United States? Sketch in your note-book a map showing this glaciated border in the United States.
- 16. How would you tell a glacial deposit, a terminal moraine, e. g., from a deposit made in running water?
- 17. What evidences have you found here in Morgan Park of past glacial action?

The difference between the class discussions and library exercises is that in the former a question is assigned which the student must make an effort to think out for himself, using only such hints as the teacher chooses to give, and his own text-book or the celestial globe, while in the latter the student is referred to the literature of the subject for the answers to the assigned questions.

Library exercises cannot therefore be made use of unless the class has access to a small geological library. The following list may be found useful for teachers. It is the list to which the students who did the work described above had access:

U. S. Geological Survey Reports, Nos. 4-17, inclusive.

Tarr's Elementary Physical Geography.

Le Conte's Elements of Geology.

Dana's Manual of Geology.

Geikie's Text-Book of Geology.

Geikie's Class-Book of Geology.

Reports of the State Geological Survey of New Jersey, 1872-1896, inclusive.

Wright's Ice Age in North America.

National Geographical Society's Monographs, 1-10, inclusive.

Shaler's Nature and Man in America.

Whymper's Scrambles Amongst the Alps.

Judd's Volcanoes, Past and Present.

Geikie's Elementary Lessons in Physical Geography.

Mills' Realm of Nature.

Dana's Corals and Coral Islands.

Hinman's Eclectic Physical Geography.

R. H. Cornish.

MORGAN PARK ACADEMY, University of Chicago, Morgan Park, Ill.

NOTES.

The Great Australian Desert.—The following notes regarding the Great Australian Desert are taken from the March number of The New Illustrated Magazine.

The desert region covers an elliptical area running about 1,600 miles east and west and 800 miles north and south. The driest part of the desert is near Salt Lake Eyre, once an inland sea receiving large inflowing rivers. Careful study of the features has lead to the following conclusions:

"That the country had at some period been covered by showers of volcanic ashes saturated with water, and this had led to the deposition of hydrated silica, which cemented together the

sandy surface of the plain, forming what is known as desert sandstone. The subsequent desiccation of the climate and the eroding influences of extremes of heat and cold had finally broken up and partially disintegrated this covering sheet of desert sandstone.

"The harder portions, which have resisted this weathering, now stand at an elevation of from 100 to 200 feet above the surrounding country, presenting in the distance the appearance of high flattopped ridges with bold escarpments on the south side, the level tops being covered with the desert sandstone.

"The finer sandy portions of the disintegrated mass are blown for long distances, and are found in the form of long, low, parallel ridges of sand, running generally in a northwest and southeast direction.

"The sense of solitude and desolation that oppresses one in these sand-hills is most appaling. From the time you enter them you are dominated by the one desire to get out of them. With the exception of the plaintive wail of the dingo or the hum of the ubiquitious blow-fly, absolute silence reigns, and your range of vision is so restricted by the low scrub and sand-hills all round that you feel a sense of almost imprisonment. The harder portions of the disintegrated mass, usually in the form of stones of a few pounds in weight, remain in situ, and the whole country looks as though it had rained stones. As far as eyes can reach in every direction over the plains there is nothing to be seen but bare shining stones, having a polished surface, from the sand continually blowing over them. They are locally known as 'gibbers.'

"The only herbage is in small depressions where the water lodges immediately after rain. The mean annual rainfall is about five inches, but lengthened periods of time frequently elapse without any rain falling; the country is then reduced to the condition of an almost impassable and waterless desert. On the northern side of this sand and gibber-strewn region there is an elevated tract of country known as the MacDonnell Ranges; here the aspect of the country changes. The rainfall increases, the mountains are bold. Bare rocky ranges rise up 1,000 feet to 2,500 feet above the surrounding country, which is sandy, but in places comparatively fertile. The flanking ranges of hills are weathered into bold headlands, capes, bluffs, etc.

"The MacDonnells themselves are three parallel ranges of mountains running east and west, and separated by narrow valleys; the most remarkable of these, which has been mapped by the explorer, has been named "Horn Valley." The total length of this extraordinary valley is 100 miles and it is only 400 yards in width. It is flanked on both sides by rugged wall-like ranges of rock 700 to 800 feet in height. The only passes are the narrow rocky gorges through which the watercourses pass.

"There are no permanent streams in Central Australia, but in times of tropical rains immense volumes of water rush down from the barren hills, and, flooding the usually dry channels, overflow the shallow banks and inundate great tracts of sandy country, causing a luxuriant growth of vegetation. The Finke river is the largest of these water courses; it drains an immense area, running north and south, and has many important tributaries coming in from the east and west.

"To the west of the MacDonnells about 75 miles are a series of granite ranges, where occur some striking phenomena at times. In the afternoon frequently on a hot, still day, loud explosions are heard, with great crashing of rocks. The early explorers attributed these to earth tremors, but they are now accounted for by the fact that high up on many of the abrupt faces of the gorges are lodged enormous masses of independent rock of all shapes and sizes, many having the form of tall pillars. They rest, owing to the weathering of the surrounding rock, on very insecure bases. a very hot day, when the sun gets low in the heavens, the eastern side of the rock is in the shade and cools and contracts rapidly, while the western side is exposed to a fierce sun and expands. mass scales off the rapidly cooling side. The centre of gravity is thus suddenly shifted; the rock loses it balance, and a mass of some thousands of tons is hurled into the valley below, over-turning and smashing in its descent other great masses and shaking all the adjacent country, the noise reverberating through the gorges, like peals of thunder. This is succeeded by a dead stillness, only to be broken again in the same manner, and thus the process of denudation goes on.

"The mountains of the MacDonnells rise to a considerable altitude, Mount Heughlin being 4,760 feet above the sea-level and others over 4,000 feet.

"The Central Australian aborigine is the living representative of the stone age, who still fashions his spear-heads and knives from flint or sandstone, and performs the most daring surgical operations with them. He has no written and few oral traditions. appearance he is a naked, hirsute savage, with a type of features occasionally pronouncedly Jewish. He is by nature lighthearted, merry, and prone to laughter; a splendid mimic, supple-jointed, with an unerring hand that works in perfect unison with his eye, which is as keen as that of an eagle. He has never been known He has no private ownership in land, except that which is not over carefully concealed about his person. He cultivates nothing, but lives entirely on the spoils of the chase, and although the thermometer frequently ranges from 15° to over 90° F. in twenty-four hours, and his country is teeming with furred game, he makes no use of the skins for clothing, but goes about during the day and sleeps in the open air at night perfectly nude. builds no permanent habitation and usually camps where night or fatigue overtakes him.

"He can travel from point to point for hundreds of miles through the pathless woods with unerring precision, and can track an animal over rocks and stones, where a European eye would be unable to distinguish a mark. He is a keen observer, and knows the habits and changes of form of every variety of animal or vegetable life in his country. Religious belief he has none, but is excessively superstitious, living in constant dread of an Evil Spirit which is supposed to lurk round his camp at night. He has no gratitude except that of the anticipatory order, and is as treacherous as Judas. He has no traditions, and yet continues to practice with scrupulous exactness a number of hideous customs and ceremonies which have been handed down from his fathers, and of the origin or reason of which he knows nothing. Ofttimes kind and even affectionate to those of his children who have been permitted to live, he still practices, without any reason except that his father did so before him, the most cruel and revolting mutilations upon the young men and maidens of his tribe." R. E. D.

The Tsangpo of Tibet.—The October number of the Calcutta Review contains a carefully written article by Mr. Graham Sand-

berg, illustrated by two maps, on "The Great River of Tibet; its course from source to outfall," in the course of which we are furnished with an interesting and striking résumé of the existing data regarding the Tsangpo. The sources Mr. Sandberg locates approximately in longitude 82° 10′, and about 20 miles southeast of Lake Ma-p'ang, where the native tradition places its origin. Glaciercrowned mountains hem it on three sides, while towards the east the river gradually forms itself in a large gravelly marsh, fed from the adjacent glaciers, and styled "The Sands of the Mystic Wheel." It is not necessary here to trace the detailed topography of the stream through its eastern course, but it is noteworthy to observe that the still unexplored section of the river, between the furthest point to which it has been explored from the Tibetan side and the highest point up to which exploring parties have ascended it from the plains of Assam, is only about 70 miles in length, while the distance as the crow flies from the former point to the British frontier is only 25 miles. The total length of the river, Mr. Sandberg estimates as 1,308 miles up to its union with the eastern Brahmatura, while its drainage covers some 112,000 square miles. Its sources lie at the altitude of 14,700 feet above sea level, and for 782 miles the drop is only about $4\frac{1}{2}$ feet to the mile, but after that the fall is very rapid till it emerges from the Himalayas and joins the Brahmaputra at a height of 420 feet.—The Geographical Journal, March, 1897.

The Commander Islands.—The Commander islands comprise two main islands, Bering and Copper, situated off the east coast of Kamchatka, between 54° 33′ and 55° 22′ N. lat., and 165° 40′ and 168° 9′ E. long., approximately 97 miles from Cape Kamchatka. Geographically, they are the westernmost group of the Aleutian chain, although politically they form a separate administrative district of the so-called coast province. The group was discovered on November 4, 1741 (old style), by Commander Vitus Bering on his return voyage after having discovered the mainland of America. The climate of the Commander islands is not particularly severe, but the excessive moisture and the low summer temperature make it disagreeable, though not unhealthy. During the author's visit in 1882, he established and maintained a meteorological station at

Nikolski, Bering island. The maximum temperature in Bering was found to be 63° Fahr., while the minimum was seldom below zero during the four years of observation. The difference between the summer and winter extremes is less on Bering island than on St. Paul island, Pribylof group. The islands are completely destitute of trees. In 1895 the Commander islands contained a mixed population of about 670 of both sexes. Bering island, the northwestern island of the Commander group, is situated between (approximately) 55° 22' and 54° 42' N. lat., and 165° 40' and 166° 41' E. long. Its greatest length from northwest to southeast is a little less than 50 miles, with an average breadth of about 10 miles. The southern two-thirds of Bering islands are mountains, with peaks rising to about 2,200 feet. The most conspicuous mountain of the southern mass, and the highest of the island, has been named by the author Mount Steller. The northern third of the island has an entirely different aspect from the remainder. It is described as being low, the highest elevation being slightly more than 600 feet. The land rises in a series of terraces till it forms either large plateaus with a somewhat undulating surface, or the tops of regular, flat-topped mountains. There are two groups of these table mountains. The highest altitude of the former group was found to be 577 feet; of the latter, 617 feet. The two main plateaus are the Northern plateau and Tonkoi plateau. A number of lakes are stated to exist on the island, among which may be mentioned the large Saranna lake, covering an area of 20 square miles.

There are two seal rookeries on Bering island. The great north rookery is situated on the northernmost prolongation of the island (Severni Mys, also called Cape Yuskin), about 11 miles from the main village, Nikolski, and about 10 miles from the northwest cape, Zapadni Mys. The south rookery is situated on the west coast of the island, halfway between the northwest cape and Cape Manati, nearly 16 miles from Nikolski. Copper island lies between 54° 53′ 30″ and 54° 33′ 30″ N. lat., and 167° 28′ 30″ and 168° 9′ E. long. (approximately). It is described as very mountainous, long and narrow, the length being nearly 30 miles, the average width about 2 miles. It is distant from Bering about 29 miles. From the northwestern extremity to the southeast end, the island consists of a backbone of peaked moun-

tains, from 1,000 to 2,000 feet high, and connected by ridges varying from 500 to 900 feet high. There are two distinct groups of seal rookeries on the west side of Copper island, named Karabelni and Glinka, located in its southeastern half, about 4½ miles Robben island is situated in the Okhotsk sea, 11 miles southwest from Cape Patience, on the eastern shore of Sakhalin The Robben island seals appear to be a separate and distinct herd from those on the Commander islands. St. Iona island and Shautar islands are also noticed in the report. The author speaks very unfavorably of the present condition of things as practiced by the sealers, and urges the necessity of establishing certain protective measures, which, it is thought, would, in a few years, greatly benefit the fur trade.—The Geographical Journal, March, 1897.

Bell River, Canada.—This river, which was discovered about ten years ago, has only recently been fully explored. It "may be located upon the map by drawing a straight line from the city of Ottawa to the southeastern extremity of James bay. The central part of this line will be near the course of the Bell river which is a large northward flowing stream. In crossing the watershed from the northern extremity of Grand lake on the upper Ottawa river the traveller makes four portages and paddles over three ponds, the total distance being four miles, to reach a navigable branch of this stream. On descending this he soon comes to a succession of lakes, the last of which is 33 miles long. The stretches of river discharging these lakes into one another are broken by occasional rapids, and the total descent from the height-of-land to the last lake may be about 150 feet. Below this the northward inclination of the country becomes more gradual and, at a distance of 144 miles in a straight line from the height-of-land, the water falls into the west end of Mattagani lake. This sheet of water lies east and west, or at right angles to the course of the river, and is the basin which also receives the drainage of a tract of country extending all the way east to lake Mistassini to the northward of Quebec. The united waters are discharged from the north side of Mattagani lake by the Nottaway, a larger river than the Ottawa, into the head of Rupert bay."

This river presents some interesting features which indicate that changes of elevation are taking place in that region. "The river all along looks as if something was choking the freedom of its flow, and even when the water is lowest, in summer, its channel appears brimming full. * * * The condition reminds one of what takes place when a stream is suddenly dammed up and the water floods into the uneven ground on either side." This condition can readily be accounted for by supposing that the land to the north is slowly rising, thus tilting up the river against its direction of flow.—Dr. Robert Bell, Bulletin of the Geol. Society of America, Vol. 8, pp. 241-250.

H. B. K.

The Value of Water in Central Asia.—Major A. C. Yate, in an article on the Loralai in the Scottish Geographical Magazine for July, 1897, speaks of the value of water in Central Asia in the following words: "One thing must impress the traveller in all these countries, notably Baluchistan, Afghanistan, Persia and Central Asia, viz., the value and appreciation of water. On it, in the first place, depends the welfare and prosperity of the people. It is not land that is of value, as in countries where nature sends a rainfall of forty inches or more per annum. It is water alone that is inestimably valuable in countries where not one-tenth, or perhaps one-hundreth, of the soil can be cultivated. It is needful to travel in these arid, sun scorched countries to know what the luxury of a draught of pure cool water means. * * * The native of Baluchistan shows no mean skill in the distribution of the water at his disposal. * * * These Pathans and Baluchis carry their water for miles in small channels, and so control the level that there is no under rapidity of flow. At the same time, of course, their irrigation engineering wants the exactness and finish of that of the scientific engineer. The banks are weak and tunnelled through and through with rats, and if heavy rains fall give way here and there and let the water run to waste. In this respect the Pathan and Baluch cultivator is very careless."

R. E. D.

The Nomads of Afghanistan.—In the article noted above, Major Yate speaks of the life of the natives from which a few ab-

stracts are taken. "The nomads who frequent the Bori valley in spring and autumn are known as Ghilzais, Nasirs, Kharotis, etc. Either they are owners of large flocks of sheep and goats, or they are breeders of camels. They live under awnings of black haircloth, supported on poles five to seven feet high. In these are housed men, women, children, dogs and flocks. The camels to the best of my knowledge stay outside, though the tender young ones are probably brought inside in inclement weather. These tents are called variously kegdai (in north and east Afghanistan) and gezdai (in south and west Afghanistan). The nomads, of course, winter at low and summer at high levels. The sheep and goat owners make their money by the sale of milk, wool and certain fabrics of hair and wool probably manufactured by the women. The camel owners, presumably, realize by the sale of the young stock and possibly of camel hair fabrics-but of this I know nothing certain. I do know that in Central Asia the manufacture of camel hair cloth is a very valuable one. The best qualities are perfect in their strength and fineness, and sell for about a toman The coarser qualities are very durable and camel (7s) a yard. hair saddle bags last forever. In contrast with these nomads, the settled residents of the Bori valley live in low mud houses enclosed in walls. They, too, own sheep and goats, also some cattle, donkeys, and a few poor specimens of equine stock. They cultivate the country around the village, the crops being principally barley and wheat. The law of the country forbids these settled races to have arms, but the nomads are all armed. It is an interesting and rather comic sight to watch the camel breeder's migra-The number of camels, from old to infantile, may be anything from fifty to five hundred; but they will certainly straggle over a distance of one to two miles. Camels interspersed with cows, donkeys, ponies, watchdogs, men (with swords and pronged flintlocks and quaint powder and shot belts), women and children The elder children straddle on bullocks and camels: form the line. the infants are, so to speak, buried among the loads, their towselled, half shaven heads and naked shoulders alone protruding. believe they do not get sunstroke.

Wild as these people are, their manufactures are often remarkable in their excellence, just as are the celebrated Turcoman car-

pets. The women of these Pathan and Baluch nomads produce very tasteful and delicate embroideries."

R. E. D.

Life in the Coldest Country-The coldest region of the globe. that of Werkojank in Siberia, where the lowest temperature of -90° F. has been observed, and the mean of January is -48° F. is inhabited by about ten thousand persons of the Jakut and Lamut races. In a large part of the region, according to the representations of Mr. Sergius Kovalik in the Bulletin of the Geographical Society of Irkutsk, the air is so dry and winds are so rare that the intensity of the cold is not fully realized. In the summer time the east there are sometimes terrible storms. temperature sometimes rises to 86° F. in the shade, while it freezes The latter part of this season is often marked by copious rains and extensive inundations. Vegetation is scantv. There are no trees, only meadows. The people hunt fur-bearing animals, fish, and raise cattle and reindeer. It requires about eight cows to support a family, four being milked in the summer and two in the winter. The cattle are fed hay in the winter, and are allowed to go out occasionally when it is not too cold, their teats being carefully covered up with felt. Milk is the principal food, occasionally supplemented with hares, which are quite The houses are of wood, covered with clay, and consist of one room, in which the people and their animals live together. The wealthier classes are better provided with lodging and food. The people are very hospitable, but exclusively punctillious concerning points of honor, such as the place at table.-Appleton's Pop. Sci. Mo., February, 1897.

Islands Owned by the United States.—Distributed over the mid-Pacific, in the neighborhood of the equator, are quite a lot of small islands that belong to the United States. Most of them are from 1,000 to 2,000 miles to the south and southwest of Hawaii. Some of them are near the Gilbert archipelago, and there is a considerable cluster just about the lesser distance mentioned and directly south of the Hawaiian group, including America, Christmas, Palmyros, and other islands of large size. Christmas Island

is about thirty-five miles long. It got its name originally from the fact that the famous Captain Cook stopped there on Christmas Day for the purpose of observing an eclipse.

These isles of the Pacific belonging to Uncle Sam number sixty in all. They have all been annexed to the United States under an act of Congress, which became a law August 18, 1856. This law, which remains in force today, declares that whenever any citizen of the United States shall discover a deposit of guano on any island, rock, or key, not within the lawful jurisdiction of any other government, he shall be at liberty to take peaceable possession thereof, and such island, rock, or key may, at the discretion of the President, be considered as appertaining to the United States. The discoverer is required to give due notice to the Department of State, with affidavits, describing the island and showing that possession of the same has been taken in the name of this country. He is obliged at the same time to give a bond, which is filed in the Treasury.

The discoverer, at the pleasure of Congress, enjoys the exclusive right to occupy his island for the purpose of obtaining guano, and for this product he is allowed to charge only a certain fixed price—namely, \$8 a ton for guano delivered at the ship's side, or \$4 a ton for the privilege of digging it where it lies. Furthermore, he gives guarantee by his bond to deliver the guano only to citizens of the United States, and to be used in the United States. The law also provides, curiously enough, that all offences and crimes on such islands by persons who may land thereon, or in waters adjacent, shall be deemed as committed on the high seas, on board a merchant ship of the United States, and shall be punished accordingly. The President is authorized to use the land and naval forces of the United States to protect the rights of the discoverer or his heirs.

But Uncle Sam's ocean empire includes a great many islands of far greater importance than the guano isles referred to. \ In Bering Sea there are several very large islands, besides the little Pribylov group to which the fur seals resort. \ This country owns the entire chain of Aleutian islands, which separate Bering Sea from the North Pacific. The inhabitants of these islands, called Aleuts, are particularly intelligent, much more civilized than the

Eskimo, and bear a close resemblance physically to the Japanese. Off the coast of southern Alaska is a group of islands of great size, on some of which live the Thlinket Indians. These Indians are the most artistic savages in the world, being skilful wood-carvers. Off the coast of southern California is the Santa Barbara group, comprising a number of large islands.— Washington Post.

The New York and Massachusetts Boundary.—A glance at a map will show that the western and southern boundary lines of Massachusetts do not meet at a point as they would be expected to do. The reason is that the point of the State was ceded to New York in 1853. The part ceded includes the town of Boston Corners, which, was cut off from the rest of the State of Massachusetts by a series of rather high mountains. Thus isolated, it became a center for prize fights, as the New York officers had no jurisdiction over the region and the Massachusetts officers could not get there with ease. After a famous fight at this spot the area was ceded to New York and the boundary line now is determined by the high mountains rather than by lines with no natural relation to physical features.

R. E. D.

Packing Goods for Mexico.—The following paragraph is from the annual report of Consul Oliver, of Merida, dated January 19, 1897; and appearing in U. S. Consular Reports, March, 1897:

This section of the Mexican coast, from Progreso to Veracruz, being absolutely void of safe harbors, compels me to again remind exporters to pack their goods more securely, so that they may stand the rough handling to which they are invariably subjected in their transfer from the ships to the lighters, by reason of the rough, open sea and the frequent "northers" which visit this coast during five months of each year. The merchants here are unanimous in their complaints regarding the careless manner in which all merchandise from the United States is packed. They further state that, by reason of this carelessness, they have lost a large amount of trade, which has gone to Europe, where all merchandise is skillfully and securely packed, with an eye single to the conditions referred to.

This illustrates very clearly, how a harborless coastal plain affects even a small detail of commerce. W. M. D.

Oceanic Islands.—The fact that many little Pacific islands, far from other lands, are inhabited, has long been a puzzle to anthropologists, who have wondered how the natives reached these remote specks in the ocean. Mr. Otto Sittig, knowing the general view that the problem could not be explained by the expertness of the natives as navigators, conceived the idea that the islands must have been reached through involuntary wanderings. So he set to work to collect all the instances recorded in several languages of native castaways who, while at sea in their small boats, had been carried far from their homes by adverse winds and currents to other islands of which they had never heard. He collected probably about all the well-authenticated cases that have occurred within the past 150 years, and the large mass of facts he gathered certainly seems to give an insight into the problem. He undoubtedly has shown that many of these people drifted 500 to 1,000 miles to lands where they made new homes. These researches required many months of labor, but the results were compressed into a map and a few thousand words of text, and they prove that oceanic people have remarkable migratory ability, and add another nail to the coffin of the worthless hypothesis that these natives and their islands are only the remnants of a populated continent, which, ages ago, sank under the waves. C. C. A.

Soudan.—Stretching across the great continent of Africa from east to west, and lying just south of the Great Sahara, is a chain of partly civilized kingdoms, which, taken together, are called the Soudan. The name Soudan, i. e., "Blaks," is borrowed from the Arabs who call it "Biad is Soudan," or "country of the blacks." On the east this territory is bounded by the Nile river, on the south by the divide which separates the Congo from the Tsad (or Tchad) basin, the Gulf of Guinea and the states bordering on that gulf, and on the west by Senegambia and Sierra Leone. Its extent from east to west is about three thousand miles, and its average width is five hundred miles. It is the home of the negro proper, although they are mixed with the Arabs and other races, and the population is variously estimated at from fifty to ninety millions.—The Medical Missionary, March, 1897.

EDITORIAL.

THE teacher of geography who has learned the art of asking sensible, spontaneous, live questions in the recitation room, has gained more of the true method to be followed in such work than any amount of tutoring can give. To ask questions well, one must have a thorough and sympathetic understanding of the subject matter. Each question should be based on the matter already gone over in the lesson and frequently on the unexpected answer just received to the previous question. Each question also should be a distinct step in the progress of the lesson. Each lesson should be a unit, and contain one or more large problems to be The way to the solution of each problem should be through several progressive minor problems. Each question should be a step in advance and bear the same relation to the minor problem that the minor problem bears to the larger one. Such questions call forth the best from the teacher and the pupils, and are the best kind of questions to make children think.

Questions to be avoided are first, those that carry the answer with them either in form of expression or tone of voice used; and second, those review questions, so frequently found in geographies, which are but a repetition of the same ideas and almost the same words, that are given in the disjointed paragraphs of the lesson which in so many cases has been memorized. Such questions may be a help to a lazy or poor teacher but they harm the pupils and indicate that the user knows but little geography.

Every teacher should aim to teach with but little reference to the text-book and should supplement the printed matter with personal questions as well as by additional anecdote or description. Good questions like good extra illustrations make the lesson alive. If the recitation be limited to the words and phrases of the text-book rearranged and inverted, the pupil learns little geography and rightfully wishes he could be freed from the boresome task.

From my own experience, I feel that the success of a geography lesson depends much more on the quality and order of the questions than on any other factor. The lesson must be planned with care and the questions framed to assist the progress of the work in every way. The questions cannot, however, all be planned previous to the recitation.

Planned questions imply planned answers which are an impossibility, for the simple reason that if the question call for any thought whatever on the part of the pupil, the answer will frequently vary with the individuality of the child. To make the answer just received of value the next question must be framed to supply the deficit. Such questions, framed on the moment, call for individuality in both teacher and pupils and will do much to help make geography teaching alive. Thinking and reasoning pupils make thinking and reasoning teachers a necessity and the cause of geography needs such teachers more than perhaps any other subject. If the quality of the questions improve, geography teaching must improve though perhaps slowly. This JOURNAL, which exists to help the cause of geography teaching, will devote more specific attention to this subject in an early issue and will attempt to give some illustrative help.

REVIEWS.

Natural Elementary Geography. By JACQUES W. REDWAY. American Book Company, 1897. Pp. 144.

The elementary geography, of which the title is noted above, deserves the attention it is now receiving at the hands of teachers and superintendents. The plan of the book is very sensible and the parts follow one another logically, though at times new chapters and new ideas are introduced a bit hastily and without any reason apparent to the youthful reader. Strange to say, the book is, for the most part, interesting reading, and that is rather a new feature for a primary geography. The book is to be recommended furthermore for the arrangement and style of maps, for its general neat appearance and for most of its illustrations. Some of the pictures are too ideal to present real images to a child and some are bad, the picture of a ridge on page 25 being a type of what an illustration should not be.

The development is by a series of questions, a plan, which is most excellent as a plan, but which could have been carried out more successfully. Surely few children will stop at the end of a sentence and seek the answer to a question just asked. They will naturally read to the end of the paragraph first. If they find that the an-

swer to the question comes in the same paragraph they will soon cease to look up the answers. Thus the plan would seem to defeat itself for the value of the questions are lost. The summarizing questions found at the end of many paragraphs are most commendable.

The matters of relief, drainage, rainfall and kindred subjects are well introduced and usually well treated, though much is of course left to the supposed larger knowledge of the teacher. Other matters are in one or two cases treated superficially and are out of keeping with the rest of the book. Such superficial treatment as is given to the subject of the history of the United States makes the introduction of the matter at all seem forced. There are some inaccuracies in the book that are unfortunate, as for instance the accounts of iron smelting and the origin of waterfalls in New England.

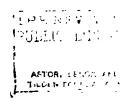
Apart from these points, the book is most excellent and we gladly commend it to our readers. Though not the book, it is more than a step in advance and a most timely one. We trust that the sequel, announced to appear at an early date, will carry out in more detail the plan followed in the elementary book.

R. E. D.

Rand-McNally Indexed Standard Atlas of the World. Rand, McNally & Co., 1897. Pp. 460.

The latest edition of the large atlas noted above, containing, as it does such a large series of excellent maps and so much statistical information, and all for a moderate sum, is one of the best reference books for schools. If a little more attention had been given to physical and climatic maps, this would have been in every way an excellent book. The maps are large, clear and carefully prepared, though of course not free from small errors. The indexes are full and well arranged and the written matter accompanying the maps is good. The book is heavy and somewhat unwieldy but this can hardly be avoided in a publication so inclusive as this atlas. Schools requiring a good descriptive and political atlas will find this book as good as can be obtained for the money. Many of the deficiencies of the book can be supplied by making good use of the large amount of material published by certain of the government bureaus and for sale at a small sum.

R. E. D.



THE

JOURNAL OF SCHOOL GEOGRAPHY

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

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Mss. intended for publication, books, etc., intended for review, and all correspondence, except concerning subscriptions, should be sent to the reponsible editor, Richard E. Dodge, Teachers College, 120th Street West, New York City.

SOME GEOGRAPHIC CAUSES DETERMINING THE LOCATION OF CITIES.

In tracing the development of the location of cities, we have to go back to a time when war was the chief occupation of life even among civilized peoples, just as it is among most savage and barbarous races to-day. The wild chieftain of a Congo tribe selects the site for his village with the same motive as did the feudal baron of the Middle Ages. Persistent warfare involves preparation for defense. Consequently, all people who are in what is known as their militant period of development place their settlements where natural conditions will afford the best protection and the least exposure to unexpected attack. Such a site is most readily found on the top of some mountain, hill, or rocky cliff to which access is difficult and even impossible in the face of resistance, and which at the same time commands a broad view of the surrounding country.

The American Indians placed their villages on hills wherever possible; and the white settlers built their stockaded forts or "stations" on eminences, even at the risk of being cut off in time of siege from their water supply in the stream or springs of the valley below. If we go back to ancient times, we find that Athens

had its Acropolis, Thebes its Cadmeia, and Troy its Pergama. though the cities overflowed down into the plains at the foot of these natural fortresses. Almost all the mediæval cities of Italy are perched like Orvieto on some high spur of the Apennines, and the enquiring tourist has often to reach them now by an inclined plane running up from the railway in the valley. The isolated security of the site of San Marino, the little city republic of Italy, has been a potent factor in its whole history. In the flat stretches of eastern Russia the towns have sought out some rise of ground, no matter how slight, to serve as their Kremlins or citadels. Stirling and Edinburgh owe their greatest beauty to their castlecrowned hills,—a feature which is repeated in Nürnberg, Marburg, Heidelberg, Eisenach and countless others. The fact that the names of so many German cities end in "burg" or "berg" [citadel and mountain] and "stein" [cliff] points to the physical character of their location. Consider Freiburg, Strassburg, Kufstein. Ehrenbreitstein, etc.

This same need of defense was also the chief motive in selecting islands as the location for settlements. The American Indians. again, were alive to the advantages of such a position; or in lieu of an island they would sometimes select the little peninsulas made by the loops or serpentines of a river, such as Cæsar, in his Bello Gallico, described as being the site of Vesontio on the The neck of the peninsula was often further River Dubis. strengthened by artificial fortifications. Paris began upon a small island in the Seine, settled by the Frankish invaders of Gaul; Venice upon a group of islands at the northern end of the Adriatic, in its origin a place of refuge from the Huns; Syracuse upon the islet of Ortygia, close to the shore of Sicily, and then afterwards spread over onto the mainland. Where the islands were not in rivers, but on the sea coast, they combined the advantages of protection with facilities for commerce. For this reason, trading stations established in a new country by a colonizing people have naturally selected such positions; and afterwards, in consequence of their natural advantages, they have grown up to be large cities. The Phœnician merchants from the island city of Tyre chose the island of Gades, on the southwestern coast of Spain, as their port on the Atlantic; and now that Gades is the modern Cadiz, the

chief port of modern Spain. Other great commercial cities with an island site are New York, New Orleans—in Jefferson's letters for the Louisiana purchase always spoken of as "the Island of New Orleans"—Zanzibar, Alexandria, Bombay, Singapore, Penango, Hong Kong and Macao. It is significant that the majority of these are held by the island-dwelling English.

In ancient days, from the very earliest history, the Mediterranean region was infested with pirates. The constant danger which they threatened to cities situated along the coast was much more difficult to guard against than the attacks of an avowed enemy when war had been declared. And when commerce was still so much in its infancy that it did not offer the great profits which would tempt to great risks, or was not yet sufficiently expanded to be seriously injured by the lack of the best trading facilities, this fear of the pirates was a motive for placing cities a short distance inland, where the sea robbers would not dare to penetrate. Consequently some of the most ancient cities were so located, like Troy and Argos. Athens was put four miles back from its port, the Piræus, Rome ten miles from the mouth of the Tiber, and Agrigentum [the modern Girgenti] five miles from the sea. Or some, like Smyrna and Ephesus, were located at the inner end of a long narrow inlet, which formed the one avenue of approach from the sea and hence could be easily defended; and thus they combined safety with good harbor advantages.

Thus, even at an early period, the needs of trade could not be wholly ignored; and as society in general passed out of the militant into the industrial stage this consideration came to outweigh all others. The modern city is essentially a center of industry and commerce, a point for collecting and distributing products of all kinds. Its location must, therefore, be as accessible as possible, at the cross-roads of the great world-highways, in sharp contrast to the isolated, inaccessible sites of the militant past. It must be easily reached by land and by sea, by ocean steamer, river packet, and canal-boat, by railway and turnpike, if it is to develop into a metropolis.

As water transportation preceded railways, we find that early commercial towns were almost always located with reference to some body of water or navigable stream. Colonial cities, founded

chiefly for commerce and living under the necessity of keeping up their trade with the mother country, have always been located on the coast, on good harbors. All the early Greek and Phoenician colonies of the Mediterranean were so situated; and the early colonial towns of North and South America, Australia and South Africa were on or near the coast. It was only later that increase of population, development of trade, exhaustion of the soil, or search for more fertile land or for mines, necessitated expansion into the interior. Many of these early settlements afterwards developed into great cities. All seaport towns possess the one advantage that they are located on the world's greatest and cheapest highway, the ocean. Their further development depends upon the area, population and products of the back country which they command, and their means of communication with that back country. The country for which Liverpool is the entrepot is limited in extent, but vast in its content, in the amount and value of its products. Adelaide and Melbourne are good ports, but their growth will be limited by the desert character of the interior of Australia. New York and San Francisco are on the opposite sides of the same country, command therefore the same area and have equally good harbors; but while New York is connected by a cheap water-way with the interior, for San Francisco the high freight rates over the Rockies are prohibitive except for merchandise of small bulk and big value, and the arid plains of the West can never support the same density of population as the fertile region which lies within the range of attraction of the port of New York.

Cities grow up at the mouth of navigable rivers, because the streams serve as natural highways into the interior of the country and afford as a rule fairly good ports. This is especially true where the mouth of the river is an estuary, for this adds the advantage that sea-going vessels can penetrate further into the continent. Such is the location of Quebec, Philadelphia, Bordeaux, Hamburg, Bremen, Stettin, Antwerp, Archangel, and others. The harbor origin of cities is indicated by the numerous names ending in "port" or its equivalent, such as Bridgeport, Newport, Devonport, Port Elizabeth, Copenhagen, Cuxhaven, New Haven, and Le Havre. Similarly it was in every case

the mouth of a river which gave the name to Exmouth, Dartmouth, Yarmouth, Geestenmünde (mouth), Warnemünde, and the countless Russian towns and villages beginning in "Ust." But the advantages of a site like that of Montreal or New Orleans lies not only in the harbors which the St. Lawrence and Mississippi afford, but also in the fact that the commerce of these two great basins falls under the natural sway of the cities at their mouths. The sway would be maintained within the lines laid down by nature if the canal and later the railway had not interfered to deflect some of the tide of commerce from both places to New York. New York, by the Hudson river, Erie Canal, and Great Lakes, lays all the broad Northwest under tribute, and by the Chicago Canal it can even tap the trade of New Orleans and the upper Mississippi.

We find cities at the confluence of two rivers, because this forms a meeting point of two routes of trade. Some part of the merchandise coming up the main stream, for instance, has to be transferred here to another steamer to be forwarded up the tributary. Such a natural distributing center affords the opportunities for trade which soon give rise to a city. Paris is situated at the confluence of the Seine and the Marne, Lyons at that of the Rhone and the Saone, Cairo, Ill., at that of the Ohio and Mississippi, and St. Louis at the mouth of the Missouri.

When goods or products are carried up a river to the head of navigation they must then be transferred to wagon or rail for further distribution; hence at this point also a city. For example, we find Pittsburg at the head of navigation on the Ohio, St. Paul on the Mississippi, Albany and Troy on the Hudson, Tver on the Volga, Allahabad on the Ganges, Tomsk on the Obi, and Ulm on the Danube. On the Rhine, Rotterdam marks the head of navigation for large ocean steamers, Cologne for smaller sea-going vessels, and Mainz for the river steamboats.

Wherever there is a decided bend in the direction of a river's course the necessity for some division of the traffic arises, and with it a city. This is characteristic of the location of Cincinnati, Kansas City, Regensburg, Magdeburg, Kazan and Tobolsk.

Where falls occur in a navigable river, and in consequence any merchandise being forwarded up or down the stream has to be

carried by land around the rapids, a settlement of some sort is likely to spring up. If later the difficulty in navigation is obviated by a canal, the town, nevertheless, continues to grow because it has a source of wealth in the water power for manufacture. Buffalo grew up where the rapids of the Niagara prevented further navigation on Lake Erie, and Louisville at the falls of the Ohio. In other cases, where the rivers have not been navigable, the water power in the falls has been sufficient to attract industry and develop manufacturing towns. Minneapolis owes its origin to the Falls of St. Anthony, which run its great flour mills. Spokane utilizes the falls of the Spokane, just as Rochester does those of the Genesee, and Troy the rapids of the Hudson. about the same relation to Albany, therefore, that Minneapolis does to St. Paul; there is a geographical law underlying the "twin city" phenomenon.

Any important isthmus that forms an obstruction on an established sea-route must give rise to a city or cities where commodities may be shifted from ships to some form of land carriage; and, furthermore, such a city must form a lively center of exchange, for the merchandise from the land-masses on either side of it must converge there. Hamburg, Kiel and Lubeck all belong to the constricted area between the North Sea and the Baltic. From the earliest times Corinth has commanded the trade moving between Hellas and the Peloponnesus. Constantinople occupies one of the finest locations in the whole world. It lies on the great southeastern highway between Europe and Asia, on an isthmus which is naturally canalled by the Bosphorus, and by reason of the latter fact is accessible to the trade from the Mediterranean and the Black Sea.

A halting place for men and merchandise naturally develops at each entrance to mountain passes, because it becomes a relay station for horses where preparations are made for the final climb. All the trade from both sides of the great barrier, destined for the other side, must find this one channel, for doubtless there is not another within hundreds of miles. Such points are therefore natural markets and hence give rise to cities. This explains the location of Cabul and Peshawar at the two entrances of the Khyber Pass, in northern India. At the northern and southern openings

of the Brenner we find Innsbruck and Verona, famous cities during the Middle Ages, when the sea trade from Venice flowed over the Alps into northern Europe. Turin has a position which is, geographically speaking, peculiarly favored; it is at the apex of four converging valleys, which lead down from some of the finest passes over the Alps—the Great St. Bernard from the north, the Little St. Bernard and the Mt. Cenis from the northwest, the Mt. Genevere from the valley of the Durance to the west, and the coast route, via Savona, from the south.

So far we have considered only the natural advantages which have determined the location of cities. These factors, though always important and always valuable, have been made to take a secondary place since the introduction of railways. Now we see towns springing up where none of these advantages exist, and where a site has little to recommend it as such, except that it is the junction of several railroad lines and so has excellent facilities for transportation. Such towns are Dallas, Indianapolis, Dayton and Columbus.

There is another kind of natural advantage, however, which, like waterfalls and rapids, give rise not to commercial but to industrial towns, where something is produced or manufactured. is evident that wherever there is a mine a settlement of some sort will grow up, such as Leadville, Col.; Globe City, Arizona; Johannesburg, in the Transvaal, or Salzburg, which owes its origin to the salt mines in the Austrian Alps. These are, however, primarily mining towns, and are not to be compared to the great industrial cities of northwestern England, which grew up where they did because that locality happened to furnish rich supplies of coal and iron in close proximity. We find a parallel to them in this country in Pittsburgh and in Birmingham, Alabama. But cities like Leeds, Manchester and Sheffield will always be intensely local; they show a population knowing only the mine and the factory; they have nothing of the cosmopolitan air of great cities like London, Liverpool and New York, which are occupied in directing the commerce of the world.

ELLEN C. SEMPLE.

LOUISVILLE, KY.

PRACTICAL GEOGRAPHY.

"Every little nook and shaded corner is but a reflection of the whole of nature."—Humboldt.

"The study of our own district is the true key to the understanding of the forms and phenomena of foreign lands."—CARL RITTER.

It should be a source of great comfort to the teacher of geography that he may lead his pupils into the presence of the forms and phenomena which they are to study. In some subjects the knowledge obtained by beginners is largely mediated knowledge, being acquired from words, figures, drawings, pictures, or some other kind of symbols. Unfortunately there are still some instances in which the teaching of geography is sought to be carried on in the same manner. The teachers ignore the material which nature has so bountifully provided, and confine their pupils to the study of that which is bought at the bookstore. This may be well for the bookseller, but it is hard upon the children.

The writer has nothing to say against the use of text-books on geography. He believes in them. They are very helpful when properly used, and we could not well get along without them. What he objects to is the disposition on the part of thoughtless teachers to place them between the children and the objects to be Time and effort are wasted by pupils in trying to learn descriptions which are well-nigh meaningless to them, as they lack power to put meaning into them. One usually gets out of a book what he is able to put into it. In other words, the value of the book depends largely on the observation, experience, and judgment of the reader. And as the observation and experience of the children are quite limited and their judgment weak, it follows that a description, no matter how excellent, cannot have for them the educative value that a careful inspection of the object has. course, a good drillmaster can get them to memorize the description and to recite it glibly for a few times, but as the words do not represent ideas in their possession they will soon be forgotten. A positive wrong will have been done to the learners, however, as they will have been initiated into the pernicious habit of learning meaningless words and of being content therewith.

In teaching geography there is no valid excuse for such an in-

jurious course. The science treats of land, water, air, vegetation, animals, and man, and these are found in every school district. Here may be found all, or nearly all, surface forms found anywhere, such as plain, "rolling land," plateau, hill, valley, and mountain—possibly. Even in districts where there are no mountains, or hills of any considerable altitude, there will be portions of the land more elevated than others, and these can be profitably used in giving correct notions of hills and mountains. If supplemented with vivid descriptions of mountains which the teacher has seen, and with pictures found in geographies and railroad advertisements, these slight elevations will prove very helpful in enabling the pupils to form fairly accurate mental pictures of real hills and mountains.

By the home stream and in its vicinity should be taught the terms ridge, slope, summit, divide, and watershed. Here also, as nowhere else, can the significance of valley and river basin be taught and their relation to the divides be pointed out. To spend time in teaching from a book, or orally, what is meant by the source of a stream, its banks, bed, course, velocity, and mouth, when the children can see them for themselves and in their proper relation to each other, is, to say the least, unwise on the part of the teacher. So with island, peninsula, delta, cave, bay, strait, and possibly rapids and waterfalls, as these, too, can be seen by the children, down by the local stream or pond, or in the street immediately after a heavy shower of rain.

Being compelled to learn meaningless descriptions is not the only wrong which beginners suffer at the hands of a teacher who ignores the material which nature has placed at his disposal. There is danger that the symbols of geography may remain the object of their study for years, and that the relation of the symbol to the object it represents may not appear to some of them until after their school years are over. Ask such pupils in what direction a river flows, and if the line representing it becomes wider towards the top of the map, they will in all probability tell you that it flows up, especially if the map hangs on the wall. To them the lakes are small patches of blue, the oceans larger patches of the same color, and the cities are specks. Had they studied the object be-

fore being introduced to the symbol this deplorable condition would not exist. They would be able to read the map correctly, as it would represent to them forms such as they had seen in the world around them, differing mainly, if at all, in size.

Not only may nearly all the geographical forms of land and water be found in close proximity to the schoolroom, but there also may be noticed the agencies by which they were fashioned still at work making new ones and changing others. The rain washes the dirt from the middle of the paved street into the gutters by the sides, where it is formed into islands, peninsulas, capes, etc., while the water forms rills, rivulets, straits, rapids and waterfalls. The soil is washed from the plowed field into the ditch by the roadside, and from the hillside into the valley, and fashioned into geographical forms, seemingly for our especial use. The rain that falls on the pasture soon washes out a tiny channel for itself. This is made wider and deeper by each successive rain, and we are soon enabled to see how ravines, gullies, canyons and many of the creeks and rivers were formed.

Down by the creek or river, if the banks are of rock, we can learn how the frost helps the water in changing the forms of the land and the windings of the stream. During a rain, and immediately after, we see that the stream is muddy, owing to the dirt that has been washed into it from the fields. We also see that it undermines its banks at one place, if they are of loose earth, and carries the dirt to another, thus changing its own course. But if the banks are of rock, so that seemingly the water cannot wear them away, the frost freezes the water left in the small cracks and crevices by the rain, and scales off the rock in thin flakes, which are washed into the stream by the next heavy rain. These sharp-edged flakes are used as tools by the water in wearing away other portions, and then ground into sand which is mixed with the loose soil and deposited somewhere along the banks in the form of mud.

The children can also be led to see that the atmosphere, especially when moving rapidly and known as wind, plays an important part in shaping the surface forms of the earth. Perhaps they have learned that air is necessary to life, but they have not heretofore regarded it as one of the three great earth-sculptors. They

have often seen dust being whirled round and round in some little hollow in the road, or even in the school-yard, but not having been taught to observe the phenomena around them they have not noticed that the wind uses the dust as a tool in widening and deepening the hollow. In a dry season they have frequently been annoyed by clouds of dust blown by the wind from one place to another, yet they did not think that the forms and shapes of the earth's surface were being changed thereby, simply because their attention was not called to the matter. Had they been taught to observe these movements and others like them, and to think what the result must be when continued for a long time, their later study of geography would have a fuller and richer meaning.

The wind, however, does not always work alone. In some places it unites with the water, greatly increasing its working capacity. The effect of the union can be studied best along the seacoast and by the margin of large lakes. The plains which border the coast in places consist of loose earth, being the wreckage or waste of the mountains brought down and deposited there by the rivers. In other places the hills and mountains are near to the sea and oppose a solid front to its further encroachment upon the land. This retards, but does not defeat, the sea, which keeps on incessantly, wearing away the adjoining land and changing the shape of the coastline. When the air is still the water accomplishes but little. But when it becomes angry and lashes the water in its fury the waves are hurled against the cliff, and even the barrier of rock succumbs to their power. If the cliff borders immediately upon the water, the waves, varying from ripples to breakers, will keep constantly at work upon it. If one of the strata is softer than the mass above it this softer rock will be worn away first, caves will be formed, and the over-hanging hard rock, being left without support, will fall and be broken into These are rolled against each other and against the cliff, and aid in wearing away other parts, as did the fragments of the undermined river banks; the process is the same.

Thus the children can be led to see that to these three agencies, water, frost, and air, the land owes its forms of contour and relief. They have rounded the hills, plowed great furrows in the sides of the mountains, and dug out the valleys. They have chiseled and

scraped the barren hillsides, and from the scrapings have made the fertile plains that produce food for man and beast. Not only have they done these great works in the past; they are doing them now as well, and doing them right at our doors, where the children can see the work being carried on from day to day. The teacher who fails to call attention to the relation of the forms of land and water in the home neighborhood to the natural forces still at work there sins against his pupils, if not against his own soul.

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THE YUKON DISTRICT.

By the recent discovery of remarkably rich deposits of placer gold in the Yukon basin much attention has been directed to the northwestern portion of our continent and any information concerning that region is eagerly sought. As a result the papers are filled with the most astonishing mixture of fact and fancy, all of which finds ready credence. It is difficult to separate the truth from the fiction, but one who has a clear idea of the more important geographic features of the region can at least tell what is possible or probable. Numerous recently published maps, all more or less inaccurate, have made the outlines of the land and the drainage systems fairly familiar, but the relief is rarely represented, except in the crudest fashion. Hence this most important physiographic factor is the one least known. But the mineral and other resources of the region and the peculiarities of its climate, especially the distribution of rainfall and range of temperature, depend directly upon the disposition of the mountain ranges, and therefore an account of the region from any point of view should begin with an account of its orography.

The dominant physiographic features of the Yukon district may be apprehended best by starting with a section through a much better known region. Crossing the continent by the Canadian Pacific railway, the Rocky Mountain range is first encountered rising abruptly from the western margin of the Great Plains. Passing this a plateau belt, something less than 500 miles in

breadth, is traversed, on the western margin of which is the Coast range, the northward extension of the Cascades. Still further west is another range whose partly submerged summits form the islands fringing the Pacific coast. Finally, rising from the surface of the high plateau between the Rockies and the coast, are several less continuous mountain groups, the most important of which are the Selkirk and Gold ranges. The characteristic features of these several mountain ranges have been admirably described in an article on "The Canadian Alps" by Professor Fay, published in the June number of this JOURNAL. Briefly summarized, then, the dominating orographic features in British Columbia are a broad mountain-rimmed plateau from which rise shorter ranges with a partly submerged range forming a fringing archipelago. these features, more or less modified, may be traced far to the northwest, through the Yukon district, in the British Northwest Territory and Alaska.

The Rocky Mountain range extends northwestward with about the same trend that it has in British Columbia, nearly to the Arctic ocean, and thence, with greatly diminished altitude, continues westward to Bering sea, parallel with the Arctic coast. In general it forms the continental divide, though two rivers, the Peace and Liard, head upon its western side and flow eastward across it to the Mackenzie.

The Coast range continues northwestward through British Columbia for some distance parallel with the Rocky Mountains, but more quickly bends westward, following the curve of the North Pacific coast line. At the head of Lynn Canal, in southern Alaska, it ceases to be a coast range, passing behind the St. Elias Alps, which here take its place next the coast. It extends a short distance into the interior and then merges gradually with the interior plateau. Throughout its entire extent, but particularly in its northern portion, the Coast range does not possess a distinct crest line, but is rather a narrow belt of deeply dissected plateau. The breadth of the belt is nearly 40 miles through the eastern margin, where it merges with the interior plateau, but is not well defined. The few rivers which cross it flow in narrow canyons, once much deeper than now, their lower portions being occupied by deep fords which are being rapidly silted up. The canyon walls are

very steep, though rarely precipitous for 5,000 or 6,000 feet from the river, while above this is a rolling upland with a great number of peaks rising to a uniform altitude of about 8,000 feet. Looking westward from a summit near the coast, the closely crowded peaks form an even skyline which strongly suggests the presence of a deeply dissected baselevel plain. The coastward portion of this upland, where the precipitation is heavy, feeds numerous glaciers, some of which reach tidewater. The interior margin is at present free from glaciers and nearly free from permanent snow, but bears the marks of recent extensive glaciation.

The St. Elias range has the form of a crescent, embracing between its two horns that portion of the North Pacific sometimes called the Gulf of Alaska. The eastern horn, partly submerged, forms the Alexander archipelago and continues southward with more or less extensive breaks through Queen Charlotte and Vancouver islands, where it is called the Vancouver range by Dawson, to the Coast range in Washington and Oregon. The western horn of the crescent, also partly submerged, forms the Kenai peninsula and Kadiak island. The central portion of the crescent, between Cross and Prince William sounds, forms the culminating point of North America with at least two peaks, St. Elias and Logan, and probably others, rising more than 18,000 feet above the This range, particularly its central portion, is very different in character from the Coast range of Southern Alaska and British Columbia. It is composed largely of rocks formed in very recent times, in the age known by geologists as Tertiary, and, according to Russell, some of the precipitous mountain faces have been formed by the breaking or faulting of the rocks whereby great edges have been exposed, as are the edges of ice blocks in a stream after a winter breaking. If this is the case its angular, rugged forms are, to some extent at least, due to the original structure rather than to the sculpturing of erosive agents. Little changed since its formation, the range thus bears the marks of extreme youth, while the Coast range as certainly by its topography shows its great age.

Passing behind the western end of the St. Elias range, as the Coast range passes behind its eastern end, is another range whose southern portion forms the Alaskan peninsula and the Aleutian

islands. It is characterized by a large number of volcanic peaks, many of which are still active. Mt. Wrangell, 130 miles from the coast, may be regarded as the easternmost of the volcanoes belonging to this system. But little is known concerning the northern portion of this range, for it occupies the least explored portion of North America. Some mountains even higher than Mt. Wrangell are said to lie between the Kuskoquim and Yukon rivers, but the information concerning them is meagre and unsatisfactory.

The interior plateau belt of British Columbia expands toward the northwest as the marginal ranges gradually diverge. Its southern portion is drained by lateral streams, the Frazer, Masse, Stikine and Taku flowing to the Pacific, while the Peace and Liard flow east to the Mackenzie. North of the sixtieth parallel, however, the marginal ranges are unbroken and the expanded plateau between them forms the great Yukon basin. There are no highways in this region except the rivers, so that while most of these have been traversed and mapped with a fair degree of accuracy, so great are the difficulties of overland travel that little is known of large interstream areas.

An appropriate and convenient name for this great upland is the Yukon Plateau. Its general altitude at the divide between the Taku, the Liard and the southern branches of the Yukon is about 5,000 feet. So far as known it retains this elevation along its southern margin at the base of the Coast and St. Elias ranges, but slopes gradually northward and westward to less than 3,000 feet near the axis of the basin. Thence it rises again, but less rapidly, northward to the base of the Rocky Mountain range. Only in a general way can this highland be regarded as a plateau, for when considered in detail much of its surface is extremely rough and broken. The larger streams have sunk their channels from 1,000 to 3,000 feet below the general plateau level, and most of them have opened out rather broad valleys wherever they have encountered soft rocks. The smaller streams in their lower courses flow in narrow, V shaped gorges, while their head branches often occupy high, broad valleys which indicate an old lowland formed near the former level of the ocean. A recent uplift has given the streams new vigor and thus the valleys are in part old and in part young. Above the general plateau level rise many rounded, dome-like summits and a few sharp peaks. These sometimes form considerable mountain groups corresponding to the interior ranges of British Columbia. The most extensive is perhaps the Cassiar range, east of Lake Ahklen, though others nearly as important are known to occur elsewhere on the Yukon plateau, but have not yet been mapped or named. Most of the mountain ranges which appear in various parts of the Yukon basin on some maps of the region are simply portions of the plateau which have somewhat the appearance of distinct ranges as seen from the rivers. When seen from the proper elevation their summits fall nearly in line with the general level of the undulating upland.

The western margin of the Yukon plateau touches Bering sea at a few points, though it is generally separated from the coast by a belt of tundra of varying width. This is a level, treeless lowland, only a few feet above the sea and dotted with innumerable lakes and ponds. The confluent deltas of the Yukon and Kuskoquim, in southwestern Alaska, form the largest area of tundra in America.

The Yukon drainage system occupies the greater part of the mountain-rimmed highland basin above described. Its trunk stream is symmetrically located, receiving tributaries of about equal number and size from either side. Considerable diversity exists in the nomenclature of the rivers in the upper part of the basin, and also some difference of opinion as to which should be considered the trunk stream and hence the true source of the Yukon. consideration of the physiography of the basin, its main axis must be regarded as coinciding with the Ahklen valley. Unfortunately another usage is too well established to permit the application of the name Yukon up to the lake, as has been attempted in some publications. This subject has been somewhat fully discussed elsewhere* and the following conclusion reached: "The name Yukon is applied to the river from its mouth to Selkirk. name Pelly is confined to what has been called the "Upper Pelly," i. e., from Selkirk to its head. The name Lewes is applied to the river from Selkirk to Lake Lindemann, called the "Yukon" by Schwatka. Finally the river flowing from Lake Ahklen is called

^{*}An expedition through the Yukon district, C. W. Hayes, Nat. Geog. Mag. Vol. IV., 1892, p. 133.

the Teslin, that being the native name as determined by Schwatka and Dawson, with the generic portion dropped. Thus Schwatka gives "Tesel-hina" (more probably Tesel-in-hina) and Dawson, "Teslin-too; but "hina" and "too" are generic terms for river, so it is properly Teslin river. The name Newberry, applied to the river by Schwatka in 1883, has never come into general use, and the name Hotalingua, which is commonly used by the miners, was, as Dawson has shown, transferred through misapprehension from another tributary of the Lewes."

The main tributaries of the Yukon below the confluence of the Lewes and Pelley are the White and Tananah on the south and the Stewart, Porcupine and Koyukuk on the north. In addition to these are many smaller tributaries, some of which have attained great importance by reason of their placer gold deposits.

With this brief outline of the main geographic features of the Yukon district in mind, one is in a position to understand its natural resources and the problems of transportation and subsistence which must be met in their development. Some of these things will be discussed in a following paper.

(To be Continued.)

C. W. HAYES.

U. S. GEOLOGICAL SURVEY,
Washington, D. C.

NOTES.

Geographical Exchange Association.—A year since a committee of the New England Association of Educational Workers was appointed to form an association of teachers for the exchange of geographical material, and to secure from the government and the commercial world products and laboratory material for use in teaching geography. The present membership is largely in eastern New England, comprising mostly normal school teachers, city supervisors of nature study, principals of grammar and training schools. For the exchange of products each member sends the secretary periodically a list of what he can furnish from his vicinity and also what he would like to receive. The secretary forwards to each member duplicates of these lists, thus making direct exchanges

Plant, animal and mineral specimens from seashore and country are exchanged for illustrations of processes of manufacture available in the cities.* It is purposed to obtain from manufacturers and importers sets of specimens illustrating (and of course incidentally advertising) their merchandise. Thus S. S. Sleeper and Co., of Boston, are supplying free, to members of the association, generous quantities of the finest spices in their crude form, arranged They intend to issue an accompanying illustrated pamphlet telling the story of the production and preparation of their spices. As the association grows in numbers and influence it is hoped that much more may be obtained from the Agricultural Department and the Consular Service than is now possible. change between different countries and sections, and within each section between country and city, will naturally lead to the formation of a number of associated exchange committees. To this end teachers in the Central States are invited to correspond with Miss Zonia Baber, of the Chicago Normal School. desire membership should apply to the secretary, Miss S. E. Brassill, South Weymouth, Mass. Initiation fee one dollar. No yearly dues. P. E.

The Effect of Oil on Waves.—The pamphlets published by our Hydrographic Office at Washington, on "The Use of Oil to Lessen the Dangerous Effect of Heavy Seas" contain many examples which landsmen might put to service as collateral reading in schools.†

The newspapers of January 14th reported the arrival at New York of the steamer "Dresden," damaged by two monster waves

*Photographs and lantern slides, made by the members, of the land forms and like scenes of their vicinity will be also exchanged. That those who fear they cannot give as well as receive may join, articles secured for the members will be valued at a small cost price and the members' debit and credit items balanced periodically.

† It is probable that teachers who are particularly interested in this matter can obtain copies of the above-named pamphlets by addressing "The Hydrographer, U. S. Hydrographic Office, Washington, D. C." A formal style is recommended in all such correspondence. Full-sized letter paper, not note paper, should be used. The endorsement of the school superintendent, certifying to the proper use that would be made of the pamphlets, would probably be advantageous in securing favorable attention to the request.

on January 6th, in lat. 49 N. and long. 50 W. One wave swept the deck, broke in the door of the saloon and flooded that compartment. A little later, another wave came aboard, smashing two life-boats, and striking down the chief officer and leaving him bruised and senseless. The sea continued very rough and the captain ordered "four perforated bags filled with machinery oil hung over the vessel's side. This quieted the waves and there was no further trouble."

The British steamship "Napier" left Baltimore for Cork on January 26, 1885, and when in lat. 37 N., long. 50 W., encountered a hurricane from the northwest. Tremendous seas came aboard over the stern, flooding the deck and doing much damage. "Happening to think of the effect of oil," the captain hung out two oil bags near the bow. The slick from the oil spread out like a fan astern of the vessel. Great following seas would sweep along toward the ship, but on entering the slick they would subside, and only a heavy swell would reach the vessel. The "Napier" ran before the wind in this way for three days and nights, and not a drop of water came aboard. On leaving Baltimore this steamship was in company with seven others, two of which have not been heard from. The rest were three or more days later in reaching port than the "Napier," as they had "heaved to" (headed towards the wind) during the storm, while the "Napier" had safely run before the wind.

A fishing schooner had the following experience: A tremendous gale from the northwest was blowing, and the vessel was "lying to" (heading towards the wind). The sea made a clean sweep over the deck, carrying away three boats, smashing the rail, and driving the crew into the rigging, where they stayed two hours, "until it occurred to some one to use oil." A bed quilt saturated with oil was hung overboard, and the effect was such that the crew were able to move about the deck in perfect safety; not a drop of water came over the side after the use of oil was begun.

Examples of this sort can be given without number. The subject is one which the editors of the JOURNAL will expand further, if so desired by the readers.

Somewhat like the slick produced by the artificial use of oil are the patches of smooth water where oily exudations arise from a

muddy bottom, as in the so-called "Oil ponds" of the Gulf of Mexico, near the Mississippi delta. Analogous to these are the remarkable "smooth-water anchorages" of Aleppi and Narakal, on the west coast of India, near the extremity of the peninsula, as described in the Geology of India by Oldham (Calcutta, 1893, 405). The smooth water occurs over shallow mud banks about four miles in length, whose position varies in the course of years within the extreme limits of about eleven miles. The sea bottom on the banks is composed of very soft mud, which readily mixes with the sea water, and smooth water can always be found over the mud banks, though open to the full force of the southwest monsoon, however tempestuous the sea outside may be. this peculiarity which first attracted attention, and rendered them important to the navigators of a coast where there are no sheltered harbors. * * * These smooth-water anchorages owe their origin to a bed of very soft, fine grained, greenish clay * * * and once it has become thoroughly mixed with the sea water, the waves of the open sea are smoothed off and reduced in size over the mud banks. The result appears to be due to two separate causes. In the first place, the mud contains an appreciable proportion of oily matter, and the action of oil in stilling stormy waters is now well known, but the second cause appears to be much the more important. The large quantity of impalpable mud mixed with the water increases its density, and, consequently, the waves, on entering this denser water, decrease in size and are retarded.

W. M. D.

Secondary Results of Volcanic Eruption in New Zealand.

—Mr. Henry M. Cadell describes in the Scottish Geographical Magazine, for May, 1897, some interesting phenomena resulting from a volcanic eruption which occurred in 1886. A violent eruption of Mt. Tarawera, in the northern part of New Zealand, covered an area of more than 6,000 square miles with mud and ashes. "Where the fall of ash exceeded six inches, the whole ground was covered with a dense, black skin, which, when saturated with rain, turned into an impervious bed of clay, that overspread hill and dale like a waterproof sheet. * * * The heavy rains no longer fell on a bosky, absorbent surface, but were precipitated on to a

smooth, water-tight cover which, like the slated roof of a house, shed the drops as fast as they fell. The water ran in streams down the slopes, and these united to form fierce torrents in the flat bottoms of the valleys between the hills. These hollows had, in former days, been occupied by small rills that warbled quietly down to the lakes without scooping out deep channels or notably wearing away their mossy sides. When these brooks gave place to roaring torrents that rushed along with wild fury whenever a heavy shower fell, and dried up as soon the clouds rolled away, quite a new effect was produced on their beds. The waters quickly dug out deep channels, and in a short time their courses were marked by gorges or small canons with perpendicular sides, which were undermined and further excavated by each fresh spath. ground rock being soft, light pumice fragments, with little coherence, excavation was not a difficult matter." One of these gorges was excavated to a depth of sixty feet in five or six years. Its course was determined by an earthquake fissure, but the depth of the gorge was due to erosion. Other and much deeper gorges have been produced in the same way without the aid of earthquakes.

"It is interesting to note that this is only a temporary phase of the physical evolution of the region. Provided no fresh eruptions occur, the ashy covering will be gradually washed off the hills, or at least the deposit will disappear under the growing vegetation, so that the sudden torrents will diminish in force and crosive power. The sides of the gorges will fall in, as it is not natural for soft strata to stand long in the form of vertical cliffs where the climate is moist and the rainfall abundant. Small but regularly flowing streams will again occupy the channel, and these will not be able to transport all the stuff that falls into them, so that in time there will be found a smaller tile-shaped valley inside the greater, and a step-like feature along the hillsides will be all that remains of the original perpendicular cañon walls now shown."

In neighboring regions where the soil is a porous pumice the streams have cut canons with vertical sides 200 feet or more in height. The absence of frost which would disintegrate the walls, and the porous soil which permits the rain to sink into the ground instead of streaming over the surface renders this possible.

Other results of the eruption are seen in a great chasm that

has cleft the mountain into two parts, extending for a distance of over nine miles through the top of the mountain and across the site of Lake Rotomahana at its base. The eruption produced a row of deep craters along this line. During the explosion the old lake Rotomahana, on whose shores were situated the beautiful White and Pink geyser terraces, was entirely blown up, and a huge hole formed with a small pool in the bottom about 400 feet below the surface of the lake. Another small lake was formed along the line of the chasm, close to the foot of the mountain. Since the eruption both lakes have been gradually filling up and now they have joined into one lake, three miles in length. In eight years it rose 420 feet, and a further rise of 93 feet will permit it to overflow. A channel will then be excavated in the soft volcanic ashes, by which a considerable portion of the water will be drained off.

H. B. K.

Ceylon.—The following notes are taken from the Scottish Geographical Magazine for April, 1897:

Climate.—"The intense heats of the hot season in the plains of India are not known in Ceylon; but, on the other hand, there is no cold season, no winter. Still, the island having a mountain roof, Europeans who have time and money may command a climate where, if the sun smites fiercely at noon-tide, the nights are cool, or even cold."

In spite of the small size of Ceylon—only four-fifths as large as Ireland—the annual rainfall varies in different parts from 200 inches down to 33. This is because the island lies right in the track of the monsoons, and has a high mountain roof, which condenses the watery vapors, and so produces periodic rains. Of course, vegetation and scenery vary signally in the dry and the moist regions, the hills and the low country. The driest parts are in the northwest and southeast, where the moist winds sweep across without encountering any hills. These parts exhibit a good deal of scorching sand and dry, thorny scrub. The wettest parts are to the south and southwest of the hills.

Gems.—Ceylon from very early times has been noted for the gems found in the granite detritus. The main seat of this somewhat speculative industry is near Ratnapura, below Adam's Peak;

but old gem-pits exist high up in the mountains, and elsewhere. The most valuable stones are sapphires and cats'-eyes; the rubies have less value, but some of the cheaper stones—amethysts, garnets, and particularly the cinnamon stones—are very pretty. The opalescent stones, styled moonstones, are quarried out of the rock in the neighborhood of Kandy. These gems are cut somewhat rudely with the aid of the corundum found in the country.

People.—"Two native languages are spoken in Ceylon, Sinhalese and Tamil." The population is about 3,300,000. Europeans, mostly planters, number barely 6,000.

Many common expressions in daily use among the natives sound curiously to our ears. "If a man be asked in the witness-box, 'What time was it when so-and-so happened?" he very likely raises his arm skyward and says, 'The sun was so high before (or after) sun-turn.' Or he may say 'There were so many feet of human shadows before (or after) sun-turn.' Or, perhaps, he may say, 'This happened about the time when priests eat.' (The Buddhist priest, or rather monk, is supposed to take but one square meal per diem, viz., about 11 A. M.) Or he may say, 'About the time when bees play' (about 4 or 5 P. M.), or 'About the time parrots fly home to roost.'"

The Forests.—By far the greatest part of the 25,000 square miles of the island is uncultivated, but the amount of good timber (some valuable woods, ebony, satin-wood and calamander) is small owing to poaching and the native manner of cultivation. The villager clears and burns off a block of forest, raises a crop or two and then abandons this piece and clears another. Naturally this is disastrous for the forests and the soil.

Animal Life.—Elephants, panthers, bears, buffalo, several kinds of deer (including one no larger than a cat), pigs, jackals, monkeys, etc., were once abundant, although now some are scarce owing to the settlement of the country by Europeans. A pearl fishery occurs at intervals on the northwest coast and brings an occasional windfall.

Planting.—For many years Ceylon produced much coffee. The government sold large tracts to the Europeans, who caused the forests to be cleared and established plantations. In 1873 coffee-planting obtained its zenith. The yield was generous and

prices were high. Speculation and inflation naturally followed and the crash came. Then disease attacked the bushes, and in 1882 coffee-plantations were sold for a song.

After several unsuccessful experiments with various staples tea was introduced and thus far has proved a great success. Whether in time tea may fail as did the coffee is yet to be seen.

The situation and harbors of Ceylon are invaluable to Great Britain, close to India and on the high road to the Far East and their Australian Colonies. Doubtless if England had not taken possession of the island some other Power would, and in general England governs the native populations more humanely than any other power. But, side by side with what they have done for the natives, three unhappy mischiefs have grown up in the country—drinking, gambling and false litigation.

H. B. K.

The Oural Mountains.—The Oural mountains, separating Eurasia into two parts—Europe and Asia—are commonly represented in geographies as Alpine in their characters. "As a matter of fact, the region is a broad, moderately elevated dissected plateau, the valleys are relatively broad and open, the hills rolling and with few sharp contours, while here and there peaks like Bolchoi Taganai, the highest peak in the Ourals, rise slightly above the sky line. Great monotonous forests of birch and fir cover the slopes with open park-like forest occasionally at higher altitudes. The region is rainy, but there are practically no lakes or morasses. The few inhabitants are mostly employed in mines."

R. E. D.

The Gobi not a Desert.—Mr. W. Obrutscheff, in his book "Aus China," treats at length of the physical features of the Gobi, and brings much evidence to show that this vast region is not a desert, like the African and Arabian wastes to which it has often been compared, but is a plateau with all the characteristics of a steppe. Once a part of the sea-floor, its many hills and valleys are the result of long erosion since its elevation. Atmospheric precipitation fails in no part of the Gobi, and, though the quantity of rain or snow is not large, it suffices, in most years, to produce a good

growth of grass. The caravan route to Urga is traversed every year by 100,000 camels with their loads of tea, and the wells in this most barren part of Mongolia are usually not more than twenty to thirty miles apart. The wandering Mongolians have large herds, and only in the driest years have they any difficulty in finding sufficient quantities of fodder. The author says that only in certain areas does the Gobi approach the character of a desert, and even these regions do not compare in barrenness and lack of water with the deserts of Africa, Arabia, the Tarim Basin and the Ala-Schan. (Deutsche Rundschau für Geog. und Stat., No. 8, Vol. XIX.)—Summarized in Bull. Am. Geog. Soc., XXIX., 2, June, 1897.

Egypt and Abyssinia.—Egypt and Abyssinia, with their ancient civilizations, stand in a position of marked contrast with the rest of the native states of Africa, characterized as they are by a complete absence of culture. Whilst for this reason the latter fall easily into the hands of the civilized states of Europe, the former have, down to the present day, borne a certain stamp of independence, which, in the case of Abyssinia especially, shows itself in the possession by the people of a real national spirit.

Both Egypt and Abyssinia lie on the shores of the Red Sea, and both are in touch with the Nile. This similarity of geographical position brought them, even in ancient times, into manifold relations with each other, although the nature of the two countries has influenced their development in diametrically opposite directions. Both states are suited by nature for a high degree of culture—Abyssinia by reason of its elevated and healthy position, which favors work, and of its plentiful supply of rain; Egypt, on the other hand, by reason of the yearly fertilizing overflow of the Nile.

Bounded on either side by the lifeless desert, the Nile valley is of surpassing fruitfulness wherever the fertilizing stream reaches. The irrigation of the valley demands a strictly organized system of labor, on which the whole people must bring their united strength to bear, while the open nature of the country gives no scope for insurrection, and the wide desert on either side renders the flight of the disaffected or of rebels impossible. These natural conditions brought it about that more than 5,000 years ago the government of Egypt took the form of a despotic monarchy.

This despotism, whilst it wrought for the material prosperity of the land, and for the advancement of science and art among the upper orders, entirely robbed the common folk of their free development. From the most remote antiquity down to our own day, this naturally favored land has witnessed no social change or advance. Dynasty has followed dynasty without any alternation in the condition of the people, whose destiny has been shaped for them entirely without their intervention. Nor has religion done aught to break the yoke of slavery. Hence the conquest of Egypt has been an easy task for foreign nations. With a people little interested in the fortunes of their rulers, it is no wonder that in turn Ethiopians, Assyrians, Persians, Macedonians, Romans, Arabs, Turks and Franks have been able to make themselves masters of the country. Egypt can, in fact, remain an independent state only so long as no foreign enemy covets possession of the land.

Very different is the case in Abyssinia. The broken nature of the ground, and the fact that the several provinces are separated one from the other by steep, rugged, and often impassable mountains, or by deeply cut ravines, puts the greatest obstacles in the way of a united government, and favors the formation of a smaller and more independent class of states. For the same reason the old inhabitants of Abyssinia, who are related by blood with those of Egypt, have been formed into a number of separate races with distinct languages, whilst their kindred in Egypt had, on the contrary, by reason of the natural character of the country, become moulded into a homogeneous people with one language even before the dawn of history. Various circumstances however, especially the introduction of Christianity into the country in the time of Constantine the Great, have so acted on the people of Abyssinia, that even there the inhabitants of the separate provinces have likewise in a measure become united, on a federal basis, into a single political organism.

As regards the probable destination of Abyssinia, Professor Reinisch gave it as his opinion that—at least within a measurable time—it will certainly not share the fate of the Egyptians. They have been for centuries a nation of slaves, the Abyssinians a race of freemen. The conquest of the country by a nation capable of

bearing the great expense necessary is of course possible, but it may be safely said that it is a much lighter task to conquer Abyssinia than to govern it afterwards. For, in spite of the fertility of certain provinces, it is to-day a poor country, having been exhausted by its wars. To bring back its prosperity, the blessings of a secured and lasting peace are urgently needed.

In order, then, that the great natural riches of Abyssinia may be thrown open to European trade and industry, there is no need of a war, or of a costly establishment of sovereignty over the land. The old Sabaeans, and in after days the Greeks, never went to war with Abyssinia, yet the mother-countries were enriched by its treasures. In return they bestowed on the Abyssinians the blessings of culture and of a firm political status. The same method is to-day the only proper, and in fact possible, one for gaining over Abyssinia to European interests; and it is now so much easier than formerly, inasmuch as we have to do at present, not with rude barbarous hordes, but with peoples possessed of a political organization and in great measure Christian.

By securing firm friendship with the actual rulers, and by fostering trade and commerce, industry and agriculture, Abyssinia may be enabled to take her place on an equal footing with the nations of Europe within a few decades. The immediate advantage of this closer connection will naturally benefit that state which dominates the course of the Nile and the approaches to the Red Sea.—The Geog. Journal, March, 1897.

Notes on Ashanti.—Following the plan of a recent article, some extracts are herewith presented from "Notes on Ashanti," by Major C. Barter, of the British Ashanti expedition of 1896, published in the Scottish Geographical Magazine, Vol. XII., 1896, 441–458. The object of these extracts is the same as that of the earlier ones, namely, to show the practical value of articles in geographical journals to the teacher in secondary schools, and to urge upon city and school librarians the importance of supplying such journals for this class of their readers. A secondary object of the extracts is to furnish through this JOURNAL fresh information upon which teachers may draw when they have no access to original sources of information. As before, the extracts are prefaced with

headings under which they may be roughly classified for ready reference. Comments on the text are bracketed.

Ashanti, Africa. British expedition of 1896, sent because treaty of 1874, allowing open trade and prohibiting human sacrifices, had been broken; landed on beach in surf boats; marched twenty miles inland across sandy, undulating country, covered with scrub and low bush; "hot enough to make a sponge-cake perspire." Ten miles from coast, first trees, standing like sentinels of great forest beyond. Forest belt 300 miles wide; beyond its northern border (the boundary of Ashanti on north) come open prairie plains, with healthier climate and abundant big game. (Mem. This means change from equatorial rainy belt to drier climate of N.E. trade wind.) Country undulating, except a few isolated hilly districts; water courses broad and swampy. (See also notes under forests.)—Scot. Geog. Mag., XII., 1896.

Forests; Equatorial Africa. Trees over 200 feet high. Upward struggle of trees for light; very human in its aspect. Undergrowth dense; intertwining vines and stems. Parasite creepers on giant trees; some hang down, straight as a plumb line, over a hundred feet in twisted strands, like the cable hawsers of iron-clads at anchor. Air excessively damp; unceasing decay of vegetable matter; malarial swamps on low grounds with dense bamboo groves; temperature not excessive, 75-90. At night no silence, but a thousand strange noises; hissing trill of crickets; complaint of the sloth, beginning with a pitiful sound as of pain; runs the whole gamut to the most wierd, discordant screech. (Mem. Compare this with account of forest under similar sub-equatorial conditions in Malay peninsula. Both are good examples of dependence of forest on equatorial rains, and of continuity of forest wherever such climatic conditions prevail on land areas.)—Scot. Geog. Mag., XII., 1896, 445-446.

Trade Winds, Africa.—In Ashanti, during winter months, a steady cool breeze blows from a northerly direction, locally known as the Harmattan; by Europeans considered so healthy that it is named "the Doctor." (Mem. This appears to be the extension of the normal northeast trade, when the equatorial rains have migrated southward, following the sun.)

Races, Negro, Ashanti.—Villages in center of forest clearing;

connected by narrow paths through dense forest. Every habitation built of red or yellow mud plastered or knitted branches or vines of same design, varying in size with importance of owner; four rooms, enclosing an open square court; entrance at one angle; fireplace in center of court. Near by a stake, on top of which is a fetich offering. (Mem. Note uniform habit of construction, as if guided by instinct such as causes robins to build uniform nests, and prairie dogs to dig uniform burrows. Invention and variety of construction comes only in higher races.) Human sacrifice, abolished by treaty with British after expedition under Wolseley in 1874, but still practiced; now again forbidden by treaty following expedition of 1896. Major says: "he thinks the Ashanti people themselves are tired of the custom. They see that other tribes near by, prohibited from human sacrifice by civilized nations, are not visited by the wrath of evil spirits. A large part of the Ashantis "silently welcomed our approach." Signals are sent from village to village by drum beats. Descriptions of curious customs and tyrannical authority. Scot. Geog. Mag., XII., 1896, 446.

The preparation of extracts of this kind is largely a matter of practice and habit. Two hours a week spent in a library where a few geographical journals and the more important new books of travel may be consulted as they appear, will suffice for a large accomplishment at the end of a few years. Quick reading, skipping lightly over pages that do not attract attention, and skilfully scenting out passages that may be pertinent; prompt record of interesting items, without delay to inquire whether they will surely prove valuable or not and without too much care as to order; all carried forward under an elastic system framed for practical use in teaching: this may become a habitual method of work in the course of a few months; and it will prove simply invaluable to any teacher who employs it.

W. M. D.

Decreasing Rainfall on Trinidad.—The last Annual Report of the Botanical Garden on Trinidad, Lesser Antilles, says that the mean annual rainfall has slowly but steadily decreased for the past three decades and that in the period, 1882-91, the precipita-

tion was only 60.82 inches a year, which is as much rain as falls in any part of the United States except on the eastern Gulf of Mexico and Northern Pacific coasts. The residents of Trinidad are alarmed at the decrease, and the report says that at the present rate of the diminution of rainfall it is easy to estimate how much time will elapse before the island will become a desert. The cause of the diminished rainfall is attributed to the destruction of forests. Bull. Am. Geog. Soc., XXIX., 2, June, 1897.

Nebraska.—The recent sheets of the Topographic map of Nebraska, published by the U.S. Geological Survey, include portions of the valley of the Platte, representing it as a broad valley, ten or twelve miles in width, nearly level, and bordered upon either side by bluffs from 100 feet to 300 feet in height. Upon the south these bluffs are partly buried in sand hills, the sand having probably drifted there from the valley and bed of the river. broad valley of the Platte extends from the forks of the river eastward nearly to Omaha. A few miles west of Omaha, the broad valley ceases and the river turns into a narrow valley between bordering bluffs, in which it flows to its mouth. This broad valley of the Platte is a valley of deposition and the river is found flowing upon the higher part of the valley rather than along its lowest line. This is shown not only by the contour lines, but by the fact that its tributaries enter the valley and flow in it for many miles before being able to join the main river. This is notably the case with Elkhorn, Pond and Wood rivers, which flow for scores of miles along the northern edge of the valley before they find an opportunity to pour their waters into the river. Bull. Am. Geog. Soc., XXVIII., 4, 1896.

EDITORIAL.

THE editors take pleasure in calling the attention of their readers to the Note regarding the Geographical Exchange Association, found on page 241. Such an association for the exchange of materials illustrating the occupations, customs, mode of life, etc., of peoples has long been needed in this country, and we trust that

the number of members may soon be greatly increased and that all parts of our country may be represented therein. It is to be hoped that the Association will take steps, as its membership allows, to become a medium of exchange for geographical ideas as well as Indeed the possibilities of usefulness are nearly commodities. limitless. That such an association can be of great service is shown by the history of the Geographical Association of Great Britain, which has now been in existence for several years and which has recently established a branch society in Scotland. Association pays particular attention to the making and distributing of lantern slides taken from maps, photographs, etc., illustrating features of all parts of the globe. Not only are the peoples represented, but the characteristic physical features are included in the list as well as maps illustrating climate, ocean currents, etc. The slides in the collection numbered more than seven hundred several months ago and were regularly loaned to a large number of schools, each school paying a small sum for the use thereof. Many of our schools in this country have at their service means of projection, but they are not supplied with well selected slides for use. of the most service the slides must be well selected for the particular purpose desired, and this means that they must be selected by a person well-trained in geography. We trust that the new Association can help in this way before many months.

The Association can only do its best through widespread cooperation, for it is the products of distant places that each school needs to use for illustration. No one school, unless exceptionally placed, can hope to secure a museum illustrating all the features it wishes. Hence the necessity of exchange. A great range of products can be secured from our own country if teachers only cooperate. To be of general service the Association must not remain restricted as to membership mostly to the Eastern States. We hope that the progressive teachers of the Western States will join heartily in this movement.

REVIEWS.

Studies in Indiana Geography. By CHARLES R. DRYER. The Inland Publishing Company, Terre Haute, Indiana. Pp. 113 with ten maps.

Professor Dryer has done the cause of scientific geography a great service in bringing together the ten chapters on the geography of Indiana included in the book noted above and has set an example that should be followed at once in several other States. The student of scientific geography, whether in the grammar school or the university, has great difficulty in finding reliable, well sorted, and helpful information concerning the different States and physical provinces of our country. The number of teachers making use of the best in geography teaching is continually increasing, and it is to them that this book will be particularly helpful.

The book opens with a short introduction followed by chapters on The New Geography, The General Geography of Indiana, The Glacial Deposits of Indiana, The Erie-Wabash Region, The Morainic Lakes of Indiana, The Natural Resources of Indiana, Indiana: A Century of Changes in the Aspects of Nature, A Study of the City of Terre Haute, A Short History of the Great Naturally much attention has been given to the physical features of the State which has demanded that a good deal of space be devoted to the study of the glacial features of the region. These topics are considered by the best authorities and in a way to be readily understood by all. The chapters devoted to the application of the ideas brought forward in the early part of the book are most helpful. The chapter on A Century of Changes in the Aspects of Nature is very interesting and full of thought for the lover of nature. The chapter devoted to the City of Terre Haute is exhaustive in its treatment and is developed in a most logical way. The maps which have, many of them, been especially prepared for this book are well selected and contain much information, but are unfortunately somewhat indistinct on account of poor printing.

Professor Dryer has by no means exhausted the subject of Indiana Geography and we are glad to see that this book is announced in such a way that we can look for successors in the near future. Meanwhile we would like to see similar monographs prepared concerning many other of our populous States, particularly where State maps exist that may be used as a basis of work.

THE

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NORTH CAROLINA.

North Carolina lies midway between the latitude of Lake Erie and the Gulf of Mexico. The extreme western portion of the State, beginning with the Great Smoky Range, occupies the greatest width of the Appalachian highlands, and includes the highest peaks of the Appalachian mountain system. Hence it stretches eastward a distance of five hundred miles to the Atlantic Ocean. It occupies the central and widest portion of the Piedmont plateau and the Atlantic coastal plain.

Its northern boundary, as defined in the charter and in the constitution of North Carolina, is the parallel 36° 30' north latitude. The actual marks on the ground, however, vary, more or less, from this line throughout the length of the boundary. As determined by the United States Coast and Geodetic Survey its eastern extremity is in latitude 36° 33′ 15″, and a point upon the line near its western end is in latitude 36° 34′ 25.5″. Between these points its course is very irregular, varying to the north and to the south, owing to the inaccuracy of the method used in marking it.

Its southern boundary, which is very irregular, begins on the

coast at Goat Island, in Little River Inlet, in latitude 33° 51′ 37". From this point it runs approximately northwest, a distance of ninety miles. Thence its course is generally westward. treme western part, of which the southern boundary of Tennessee is a continuation, lies on the parallel of 35° north latitude. line should run northwest to the latitude of 35°, and thence along that parallel. But the course from the starting point is 47° 30' W. (S. C. Surveys), "and instead of pursuing the parallel of 35° it turns west about ten miles south of that line and, then, on approaching the Catawba river, turns northward, pursuing a zigzag line, to the forks of the Catawba river, which is about twelve miles north of that parallel; and from this point to the mountains the boundary line runs not west, but N. 88° W., bringing its western end about seventeen miles too far north, and reaching the (supposed) parallel of 35° at a distance of about 130 miles east of the Catawba River. The loss of territory resulting from these singular deviations is, probably, between 500 and 1,000 square miles."

The western boundary runs along the crest of the Great Smoky Mountains. "The commissioners who completed this line, instead of following their instructions, diverged from the crest of the Smoky (Unaka) Mountains at the intersection of the Hiwassee turnpike, running due south to the Georgia line, thereby losing for the State the valuable mining region (copper) since known as Ducktown."

The extreme length of the State from east to west is 503 miles; its average breadth, 100 miles; and its extreme breadth from north to south, 188 miles. It has an area of 52,286 square miles, of which 48,666 is land and 3,620 water. It is almost exactly the size of England and is about five-sixths of the size of the whole of New England.

The surface of the State is naturally divided into three parts: the western or mountain section, the middle section or hill country, and the eastern section or low country.

The eastern section lies along the sea coast, and extends west-ward to the hill country, a distance of from one hundred to one hundred and twenty-five miles. It is a broad plain, generally level throughout, rising gradually from the sea to a height of about three hundred feet along its western border. In its extreme

western part, in Moore county, it attains a height of about five hundred feet.

The tide-water section comprises the lower part of this plain, which extends up to the head of the tides. Here the surface is almost a perfect level, having a rise of less than one foot in a mile. Near the southern end of this tide-water section the Wilmington and Weldon Railroad has a stretch of forty miles, where there is neither curve, excavation nor embankment.

As the rivers at the tide-water section approach the ocean they gradually broaden out into shallow seas, which are known as sounds. The largest of these sounds are Pamlico and Albemarle. Pamlico Sound is about seventy-five miles long and from fifteen to twenty miles wide. Albemarle Sound is fifteen miles long, and from five to fifteen miles wide.

The sounds are separated from the ocean by a barrier of sand, which extends along the whole eastern border of the State, a distance of over three hundred miles. Numerous inlets connect the sounds with the ocean and divide this barrier into a number of long and narrow islands, called "The Banks."

The coastal plain is an old sea bottom that received the waste of the land in an earlier age. It was gradually raised above the sea and cut down by the rivers that had furnished the materials for its building. After the rivers had widened their valleys and established their drainage areas, the whole region was again slightly submerged and the lower ends of the valleys became sounds.

The waves rolling in from the sea break when they strike shallow water, and deposit the sand that they hold in suspension. The inflowing tides have also set back the rivers, quieting their waters and causing them to deposit the detritus brought down from the land. In this way the Banks have been built. These banks, or islands, vary in breadth from a few yards to two miles; in length, from two or three miles to fifty miles; and in height, from a few feet to twenty-five or fifty feet above the level of the sea.

The vegetation here is scanty, consisting mainly of a few stunted trees, scattered over the more elevated parts, and grass, which grows sparingly all over the islands. A few miles north of Nag's Head there are forests of long-leaf pines which will compare favorably with any on the mainland. South of this point the trees are palmettoes, stunted pines and live-oaks. The fig, which is common on Ocracoke Island, attains here a size greater than on the mainland, and equal, perhaps, to that of any other tree on the island.

The inhabitants of these islands, who are called Bankers, live mainly by fishing. Whales are occasionally seen along the coast, and hardly a season passes without one or more being harpooned. Many flocks and herds of sheep and cattle are owned by the Bankers. Herds of wild ponies roam over the islands and feed on the coarse grasses of the salt marshes. "Pony pennings" are held every year, when the ponies are driven together and branded with the mark of some proprietor.

The middle section extends westward from the low country to the foot of the Blue Ridge, a distance of about two hundred miles. Its eastern boundary is what was once a line of sea-beach, which may be traced from a point near Ridgeway, in Warren county, through Franklin, Wake, Chatham, Moore, Cumberland, Montgomery and Anson counties, entering South Carolina just west of Chesterfield Court House.

The ascent from the eastern section of this middle region is about two hundred feet in two or three miles, and is marked by falls, or rapids, in all of the rivers. The monotonous landscape of the low country is left behind. Here we have hills, dales and rolling uplands. The region is a plain, above which such residual hills as the Brushy, South and Saluda mountains rise from 1,200 to 1,800 feet, or from 1,300 to nearly 3,000 feet above the level of the sea.

This section is crossed by a low range—the Uwharrie and Occoneeche Mountains—and between these and the Blue Ridge rise such isolated groups as King's Mountain, Crowder's Mountain, Sauratown Mountains, or single peaks like Anderson's, Dunn's and Pilot Mountain. In this Piedmont section the divides between the water courses all stand at about the same height. This height probably represents the level to which the country was worn in some former time when it stood much below its present level.

The western section extends from the base of the Blue Ridge, on the east, to the crest of the Great Smoky Mountains, on the west. These two mountain chains cross the State from north-

east to southwest. In Watauga county their crests are only about fifteen miles apart, but they diverge toward the southwest until the distance between them is something over fifty miles.

The Smoky Mountains have an average elevation of 5,000 to 6,000 feet, many of the peaks being more than 6,500 feet above the sea. This is the greatest of all the mountain ranges in the Appalachian system. It has many names applied to it at different points along its course, as Stone Mountains, Iron Mountains, Unaka Mountains.

The highest point in the Smokies is Clingman's Dome, which is 6,660 feet above the sea. Other important peaks are Mt. Guyot, 6,636 feet; Le Conte, 6,612, and Roan Mountain, 6,306 feet above sea-level.

Notwithstanding their massiveness, the Smoky Mountains are cut through in seven places by rivers which take their rise on the western slope of the Blue Ridge and flow into the Tennessee. These water-gaps, or gorges, are from 3,000 to 4,000 feet below the mountain tops on either side, and some of them have nearly perpendicular walls to the height of a thousand feet.

The Blue Ridge Mountains are scattered along the eastern border of the mountain region. Their course is irregular and winding, and they do not constitute a well-marked mountain chain. To the east there is a sharp descent, through a few miles only, of about 1,500 feet. Viewed from the east, these mountains present a bold and rugged front; but from the west their height seems comparatively insignificant, and their outlines marked by gentler curves.

The passes, or "gaps," between the several peaks are sometimes even lower than much of the surrounding country just west of the range. At Round Knob, near the Swannanoa Gap, where the railroad crosses the mountains, the beauty of the scenery passes description. One of the interesting features here is a fountain which throws a stream 268 feet into the air, where it breaks into spray and vanishes in mist. The crossing of the railroad over the mountains is one of the most remarkable feats of railway engineering on the continent.

The mean elevation of the Blue Ridge is about 3,500 feet. The highest point, Grandfather Mountain, is 5,879 feet above the sea. The mountains of North Carolina are usually covered with soil and clothed with forests to the summits. Many of the spurs and offshoots of the Blue Bidge are, however, exceptions to this rule. Among these may be mentioned Table Rock (3,918) and Hawk's Bill (4,090), in McDowell county, and the Whiteside Mountain (4,931), in Jackson.

Between the rivers of this section are cross ridges connecting the two main ranges of mountains. It is on these ridges that the highest peaks are found, the loftiest of which are the Black Mountains. One of this group, Mt. Mitchell, in Yancey county, is the highest point of land east of the Mississippi river. It is 6,707 feet above the level of the sea. This peak is named in honor of Professor Elisha Mitchell, of the University of North Carolina, who lost his life in 1857, while exploring this region. Dr. Mitchell lies buried on the summit of the mountain, where a bronze monument marks his grave.

The valleys between the cross ridges have an elevation varying from 2,000 to 3,000 feet, with smaller benches and marginal terraces from 3,500 to 4,000 feet above sea-level.

Many of the high summits, especially in the Smokies, being destitute of trees, are known as Balds. They are covered with grasses that afford the finest pasturage, with ferns, and with small shrubs, some of which belong to extreme northern latitudes.

Drainage.—North Carolina is well watered and well drained. The Blue Ridge constitutes the watershed between two systems of drainage, one lying on the Atlantic Slope and the other in the Mississippi Basin. West of the Blue Ridge are the New, Watauga, Elk, Nolechucky, French Broad, Pigeon, Tennessee and Hiwasse, which reach the Mississippi through the Tennessee and the Ohio rivers. All of these, except New river, flow through the Smoky Mountains. The Tennessee plunges through in a stupendous chasm of over 4,000 feet in depth. East of the Blue Ridge, the rivers rise on the mountains opposite the headwaters of the western rivers, or among the hills of the middle section.

Of rivers that rise in the mountains, only one, the Roanoke, reaches the sea within the borders of the State. The rest, the chief of which are the Yadkin, the Catawba and the Broad, follow the softest rocks and flow toward the northeast until they pass

the harder rocks of the Brushy, South and Tryon mountains. Then they sweep round in broad curves and pass into South Carolina, where they are known by other names. The Yadkin receives the waters of the Uharie about forty miles north of the State line, and is then known as the Great Pee Dee. Tar river, from its junction with Tranter's creek to the Sound, is known as Pamlico river. Many interesting stream adjustments have taken place between this and its neighboring streams.

The Chowan, which rises in Virginia, and the Roanoke flow into Albemarle Sound. The Tar and the Neuse have their headwaters near together in Person county. They flow in a southeasterly direction into Pamlico Sound: The Cape Fear, which is formed by the union of Deep and Haw rivers, flows directly to the Atlantic Ocean.

Near the coast are many large fresh-water lakes. One of these, Lake Mattamuskeet, has an area of a hundred square miles.

Many swamps in the tide-water belt occupy the lowlands along the rivers or near the sounds. Others, very unlike ordinary swamps, occupy the watersheds between rivers and sounds, and are the sources of rivers. Bay River swamp, in Beaufort and Craven, and Green swamp, in Brunswick and Columbus counties, are examples of this kind.

The Great Dismal swamp is partly in Virginia and partly in North Carolina. It lies on a gentle slope to the east, and receives a few small streams on the west. Lake Drummond, near its center, is a spring of clear water about six miles in length, and lies twelve feet above the eastern border of the swamp. The western border is higher and is thirty-eight feet above the level of the sea. Cypress, juniper and white cedar trees abound, and on the higher ridges are oak and beech trees. The Dismal swamp canal connects Pasquotank river with Elizabeth river in Virginia, and small boats plying between Elizabeth city and Norfolk, Virginia, pass through this canal.

Soils.—The soil of the eastern part of the State is composed of the gravels, sands and clays washed down from the middle section. On the uplands it is a sandy loam of moderate fertility, and well suited for the cultivation of cotton. Bordering on the swamps and streams, the soil is black, peaty and of great depth and remarkable fertility.

In the middle and western sections the soil is principally clay, and is of varying fertility. Along the streams, and in most of the mountain coves, it is exceedingly productive.

Climate.—Every variety of climate known to the eastern United States is found in North Carolina; but at no one station is the range of temperature very great. The mean annual temperature for the whole State is 59° Fahr., the same as for the middle section, and the annual rainfall throughout the State is fifty-three inches. At Southport, near its southern end, the mean annual temperature is 66°, the same as that of Mobile, Ala., and Natchez, Miss. Goldsborough, nearly midway between the northern and the southern border, has a temperature of 62° Fahr.

The eastern section projects almost into the edge of the Gulf Stream, and its southern border lies within 34° of the equator. In its northern part, along Albemarle Sound, it has a mean annual temperature of 60°, which is nearly the same as that of Naples, Italy.

The middle section has a warm, temperate climate, corresponding to that of Madrid, Spain, and Marseilles, France. The winters are rarely severe, and the summers are cooler than in Philadelphia, New York or Boston.

The western section has a greater range of temperature than either of the other two. The valley of the French Broad has a climate like that of Paris, France. Its mean annual temperature is 54°, and its rainfall 40 inches. The Hiwassee Valley is very little colder than the middle section of the State and its rainfall more abundant (72 inches). Boone, in Watauga county, has a mean temperature (49°) like that of Boston, Mass., though its summers are never so warm nor its winters so cold. Upon the mountain ranges there is a sub-arctic climate and growth, and many peaks extend above the tree limit.

In the western section frost makes its appearance about the first of October. In the east it comes about the end of November, and in some parts it does not come at all.

Vegetation.—The vegetation of North Carolina is rich and varied. The products range from sugar-cane to Canada oats; the trees from the palmetto, the fig and the magnolia, to the spruces and firs of Canada and the far North. Five thousand species of

plants have been catalogued, and one hundred and twelve species of forest trees.

Four plant zones are represented in the State. These are separated, not by parallels of latitude, but by isothermal lines or lines indicating the location of places of equal heat. They are: 1, the Sub-Tropical Zone, between the isotherms of 69° and 62° Fahr.; 2, the Warm Temperate Zone, between the isotherms 62° and 53°; 3, the Cold Temperate Zone, between the isotherms of 53° and 42°; 4, the Sub-Arctic Zone, between the isotherms of 42° and 35°.

The Sub-Tropical Zone includes Columbus, Brunswick, New Hanover and Pender counties, with a portion of Onslow and the Banks as far north as Cape Hatteras. In this region, over 1,200 species and varieties of flowering plants have been catalogued. Two species of palmetto are found here, and many trees with thick, shining leaves, such as the live-oaks, the laurels, magnolias and myrtles.

There are here many insectivorous plants, orchids and other rare plants, which are found nowhere else in the world.

Of ornamental trees the crepe myrtle has long ago been naturalized. The fig and the pomegranate never fail, and even the banana has fruited here. The cape jessamine is often used for hedges, and Japanese tea plants, recently introduced, have been found hardy.

Many interesting plants, from different parts of the world, have been found in ballast used to fill in the wharves along the lower Cape Fear, and have already become common in waste places.

The Warm Temperate Zone extends west to the Piedmont country, including the "pine barrens" of the low country and the "oak belt" of the middle section. In its eastern portion the forests are almost exclusively of long-leaved pine, with small quantities of the loblolly pine. Its western part is characterized by forests of deciduous trees (whose leaves fall in autumn), such as oaks, with a few beeches, elms, chestnuts, etc. Most cultivated fruits, except the apple, grow here in great perfection, and some of the finest wine grapes in the United States, the Scuppernong and the Isabella, are native to this section.

The Cold Temperate Zone includes the Piedmont and mountain regions, except some of the highest peaks and plateaus. Forests

of deciduous trees are the main characteristics of this zone. Oaks, birches, chestnuts, walnuts, maples, elms, larches, alders and tulip poplars are common. There is a varied undergrowth consisting of holly, wild rose, honeysuckle, rhododendron, etc. Lincoln grapes are native to this section.

(To be continued.)

COLLIER COBB.

University of North Carolina, Chapel Hill, N. C.

CRATER LAKE, OREGON.

Lakes are pools of water on the land. They range from a few feet to many miles in extent and owe their existence to the basin-shaped depression in which they are contained. Although they belong to the general drainage systems of the land, they differ from streams not only in form, but essentially in lying below the level of local drainage. When filled up to that level, they overflow and seek their own destruction by cutting away the barrier at the outlet. They are but transient features in the topography of the land and may originate by any of many causes that produce basins upon the earth's surface.

Lakes are of great variety and interest when we consider the origin of their basins and the rôle they play in nature's drama. From this point of view, lakes have been fully considered by Professors Davis * and Russell,† to whose excellent papers all students of lakes should refer. We will not attempt to enumerate the various classes, but turn our attention to one variety, namely, crater lakes, of which there are but few examples in this country. Crater lakes are lakes which occupy the craters of volcanoes or deep pits of volcanic origin. We would expect, therefore, in the United States to find them only in the great volcanic region of the West. Although it may be said there are several lakes of this class in the West, as for example the soda lakes, Carson

^{*}On the Classification of Lake Basins. Proc. of the Boston Society of Natural History. Vol. XXI., p. 315; also Science, Vol. X., 1897, pp. 142 and 143.

† Lakes of North America. A reading lesson for students in geography and geology.

desert, Nevada, and perhaps other smaller ones, there is only one of which the country may well be proud, for, like Niagara, the Yosemite Valley and the great canyon of the Colorado, it ranks as one of the wonders of the world. It is Crater Lake of Oregon, and on account of its seclusion on the summit of a high range of mountains, it is comparatively unknown.

Crater Lake, Oregon, is deeply set in the summit of the Cascade range, about 65 miles north of the California line. Approaching the lake from every side, the observer at a distance sees a broad cluster of gentle peaks rising about 1,000 feet above the general crest of the range. These form a rugged rim encircling the lake. On arriving at the summit of the rim, a scene of majestic beauty comes suddenly into view. The deep blue lake is completely enclosed by twenty miles of almost continuous cliffs, ranging from 500 to nearly 2,000 feet in height. On account of the precipitous slopes, it is a matter of considerable difficulty to reach the lake at any point. There is no platform along the shore to walk upon; the steep slopes continue beneath the water to great depths.

The lake is nearly circular in outline, with a diameter of about five miles, and its remarkably blue water has the great depth of 2,000 feet. Its drainage area is but little larger than the lake itself. Only rain and small rills from springs and snow banks clinging to the precipitous slopes feed the lake. It has no visible outlet, but, as precipitation is greater than evaporation in that region, the water must escape by percolation, else the lake would overflow.

Near the western border of the lake is an island which is an excellent example of a small volcano with a rugged field of lava at its base. The volcano is a steep sloped cone of volcanic cinders, rising 845 feet above the lake. In the summit is a saucer-shaped crater eighty feet deep.

The scenic features of the lake are remarkable and interesting, but far more so are those of the pit and the story of its origin to be read in the composition and structure of the rim. The pit, which is half filled by the lake, is six miles across at the top and 4,000 feet deep. From the top of the rim, which is the summit of the Cascade Range, it reaches down half way to the sea-level and

nearly a square mile of bottom is below the level of Upper Klamath Lake, at the eastern foot of the range. The rim is composed wholly of streams of lava and volcanic conglomerate arranged in sheets. They are exposed in section upon the inner slope of the rim and upon all sides dip away from the lake. It is evident that the rim is merely the hollow remnant of a large volcano like Shasta or Rainier that once stood upon the site of the lake. To this ancient mountain the name "Mt. Mazama" has been given. It was lofty and had large glaciers that scratched its surface rocks and deposited moraines over its lower slopes. Deep canyons were carved in its sides and now make notches in the rim. Some of the glaciated lava has been overflowed by later streams, showing that Mt. Mazama was an active volcano in the glacial period.

How was Mt. Mazama removed and the pit formed that gave birth to the lake? This change, in which over a dozen cubic miles of lava disappeared, is certainly not due to erosion, for the lake is enclosed upon all sides. It must be attributed either to a great volcanic explosion, or to an equally great engulfment. If it were blown out, we should expect to find much of it scattered about the pit. Upon the glaciated rocks and the moraines of the outer slope of the rim there is no covering of fragmental material such as would necessarily have been strewn over them if the great pit had been produced by an explosion. We are thus driven to suppose that the mountain disappeared and the pit originated by This at first seems very difficult to understand, but, subsidence. remembering that Mt. Mazama, when an active volcano, was filled with molten material, we may be able to more readily picture the change. By finding an outlet low down upon one of the slopes of the Cascade range the molten material might escape in that direction and leave the mountain hollow to cave in for want of internal support.

This view is rendered more plausible by the occurrence of similar phenomena in the active volcano of Kilauea on Hawaii. In 1840 there was an eruption on the mountain slope below Kilauea and, according to Dana, the molten lava in the crater of Kilauea subsided to the depth of nearly 400 feet and the sides of the pit caved in for want of support. In the Crater Lake region, after the lateral outlet closed up, volcanic action continued upon the bot-

tom of the pit, and by explosive and effusive eruptions, the pit was partly filled up. The cinder cone and lava field of Wizard Island, and perhaps several other smaller volcanoes which do not reach up to the surface of the lake, were then formed.

How much more grand would be the pit without the lake, but how much less beautiful. The lake, although without visible outlet, is not salt. Its cool, fresh water has a somewhat peculiar taste.

According to Mr. B. W. Evermann, of the U. S. Fish Commission, who observed the temperature of the lake August 22, 1896,

The temperature of the surface water was	°O
At a depth of 555 feet the temperature was	39°
At a depth of 1,043 feet the temperature was	l1°
At a depth of 1,632 feet (on the bottom) the temperature was4	16°

The increase of temperature with the depth suggests that the bottom may yet be warm from volcanic heat, but more observations are needed to fully establish such an abnormal relation of temperatures in a body of water.

The water of the lake is so clear that objects may be seen at a depth of nearly 100 feet.

J. S. DILLER.

U. S. GEOLOGICAL SURVEY, Washington, D. C.

THE YUKON BASIN.

(Continued from page 241.)

In a previous paper the main orographic features of the northwestern portion of North America were briefly outlined. With these facts in mind one is in a position to understand something of the resources of the great Yukon Basin and the peculiar conditions under which they must be developed.

The extent of this basin is about 440,000 square miles, giving the Yukon rank among the greater river systems of the world. Of this area the eastern third is in the British Northwest Territory and the western two-thirds are in Alaska. It will be recalled that the basin is for the most part a highland lying between diverging

mountain ranges, the Rocky Mountains separating it from the Mackenzie Basin and Arctic Ocean on the east and north, while the Coast and St. Elias ranges separate it from the Pacific on the south. The latter ranges are the ones which exercise the most direct influence on the Yukon Basin.

The Japan current follows the long line of the Aleutian Islands toward the northeast and is deflected southward by the curving Alaskan coast. The air above this comparatively warm water of the North Pacific has its temperature raised and its capacity for holding water thereby increased. The winds are therefore saturated with water vapor which is condensed when they strike the cold summits of the coast ranges. Hence the precipitation within a narrow strip along the coast is heavier than anywhere else in The conditions which favor the precipitation of North America. moisture in this coast strip also favor its conservation in the form of snow and ice, giving rise to the magnificent glaciers which flow down toward the sea. In order to reach the interior, the winds must surmount the coast ranges which, except at a few points reach an altitude of 8,000 feet or more. But at this elevation their temperature is lowered to a point where almost no water vapor remains uncondensed and they descend as dry winds into the This continuous coastward mountain barrier therefore produces certain direct, well marked effects on the climate of the basin. In the first place, the prevailing winds being dry, the rainfall is insignificant compared with that in the coast strip, probably not more than one-twentieth as great. The absence of moisture in the air gives a cloudless sky and the few feet of winter snow are quickly melted in the spring. Hence no permanent snow collects on the interior plateau or mountains even at altitudes of 5,000 to 8,000 feet while the lower limit of perpetual snow rises rapidly in crossing the St. Elias range from about 2,000 feet near the coast to over 6,000 on its northern side. Another effect largely due to the dry air of the interior is the great annual range of temperature, amounting to more than 160°F. The cloudless winter skies permit the radiation of what little heat reaches the earth from the sun low on the horizon or entirely hid and, untempered by sea winds, the cold becomes intense, sometimes reaching 60° and 70° below zero. The same cloudless skies permit continuous sunshine for a

few weeks in midsummer and the temperature is raised to 90° or 100°. In striking contrast with this is the climate of the coast. The almost continuous cloudiness makes a cool summer and warm sea winds temper the winter cold so that the mean annual temperature of Sitka is about the same as that of New York.

The intense cold of the interior winters is not stored up in accumulations of snow and ice for reasons given above, but a part of it accumulates in another way. During the long winters the frost penetrates the soil to a great depth while the short summer suffices to thaw only a few inches. Hence, wherever there is any soil, it remains frozen throughout the year to an unknown distance below the surface. This frozen subsoil prevents the downward percolation of water from the melting snow and it is prevented from running off by the sponge-like moss, so that much of the surface is swampy even with a rainfall which in lower latitudes would cause aridity. The swamps are not confined to the lowlands, but are more apt to be found on the higher portions of the plateau and upon the steepest hillsides.

The timber line, like the snow line, rises rapidly from the coast toward the interior, its altitude increasing from 1,800 to about 5,000 feet. The vegetation is naturally more abundant in the humid climate of the coast than in the dry interior. upon the moraine-covered border of the Malaspina glacier it attains an almost tropical luxuriance. In the interior the timber is confined to the valleys while the plateau surface is practically tree-The Ahklen valley is heavily wooded, some of the trees reaching eighteen inches in diameter. The same is true of the lowlands immediately bordering the Lewes, Pelly and other tributaries and also the Yukon down nearly to the head of its delta. trees are smaller and less thickly crowded in the high, broad valleys of the basin, while on the higher portions of the plateau only a few dwarfed spruces and junipers manage to exist. are limited to a few species of conifers with some cottonwood and birch in the lower valleys. Black alder is abundant in the valleys, often forming a dense undergrowth which decreases in size toward the summit of the plateau where it forms a miniature thicket only two or three inches in height.

But more striking than the arboreal vegetation is the almost

universal mantle of moss which covers the country. It pervades the forested valleys, the hillsides, the high valleys and broad summits of the plateau, giving the entire landscape a uniform greenish-gray color. As the moss grows above it dies below, so that under favorable conditions, particularly where the lower portions remain frozen, it may accumulate to any depth. Obtaining its nourishment almost wholly from the air, it is independent of soil and covers all but the steepest rock surfaces, often giving a wholly deceptive appearance of smoothness and security to the most rugged talus slopes.

While this sponge-like mantle of moss forms an almost perfect non-conductor and prevents the sun's heat from thawing out more than a few inches in depth of the frozen soil beneath, its surface supports a great variety of flowering plants. During the short summer almost continuous sunshine forces them to a remarkably rapid growth and in a few days, while the snow-drifts still linger in the ravines, the monotonous surface is converted into a brilliant parterre. The flowers seem to have a delicacy and freshness which they lack elsewhere and their beauty is enhanced by the contrast with their somber surroundings.

In most countries insect pests are among the minor annoyances, but in this they take a prominent position in the front rank. No sooner has the snow partly disappeared than myriads of mosquitoes make their appearance, evidently finding in the wet moss a most favorable breeding place. Until the snow comes again they render life a burden to man and beast.

The coast ranges not only exert a direct influence on the climate and vegetation of the Yukon basin, but they are the chief obstacles to be overcome in reaching that region. For more than a thousand miles they present to the coast a rugged barrier, which can be surmounted only at a few points. The most direct route and the one which, during the past summer, has been thronged by a struggling mob of gold seekers, leads from the head of Lynn canal through a pass only 3,600 feet in altitude, but exceedingly rugged in its southern approach. This Chilkoot pass has been used for many years by the coast Indians, but it is not practicable for any except two-footed pack animals. Horses may, with difficulty, be taken in by a much longer route over the Chilkat and White passes, on either side of the Chilkoot.

As if to make up for the difficulties presented by the coast ranges, the rivers of the Yukon system form a series of natural highways, by which a vast region is rendered accessible. twenty-five miles of tidewater the miner reaches a lake at the head of the Lewis river, and, building a boat, he follows the current downward twenty-five hundred miles to Behring Sea. The present center of mining activity, the Klondike region, is about seven hundred miles from Lake Lindemann, and this distance can be traversed down stream in less than two weeks. Allowing two weeks for crossing the pass, the gold fields of the Yukon can thus be reached in less time than could those of California in 1849. they are in reality much less accessible, for the rivers are open only about four months in the year and, during the remaining eight months, the crossing of the coast range, even if it could be reached, is extremely hazardous by reason of the almost continuous snow storms which prevail there during the winter.

From the foregoing description of the Yukon basin, it will be readily understood that its agricultural possibilities are extremely limited. A little bunch-grass grows on some of the dry gravel terraces along the river, but in sufficient quantity to afford summer grazing for only a limited number of cattle. On the other hand the experiment of introducing domestic reindeer into this region from Siberia, now being carried on by the Government, promises excellent results and may solve the problems of land transportation and food supply for the natives and a mining population as well.

A few hardy vegetables and grains can be raised with the aid of irrigation, but the area which might be cultivated is very small. The timber is sufficient to supply all probable local demands, but is not adapted by its quantity or quality for export.

For more than a hundred years the fur-bearing animals have been a source of wealth to the great trading companies which held undisputed sway over this region. With the introduction of modern rifles, however, game has become scarce, while the competition of rival companies and independent traders has so reduced profits that the palmy days of the fur-trade are past.

The relief from this gloomy picture of the economic future of the Yukon basin is afforded by a consideration of its mineral resources. For a few years following the discovery of gold on the Yukon, in 1882, only the bars along the larger rivers were worked. When these were exhausted prospecting began on the smaller streams and, since 1890, each year has revealed more extensive deposits than the last, culminating in those of the Klondyke, which rival the richest ever found in any part of the world. bearing rocks are known to occupy a belt at least 200 miles broad and more than 1,000 in length, extending nearly east and west through the centre of the basin. In a region so vast and imperfectly explored, where prospecting must be done under such adverse conditions, it is practically certain that much gold remains undiscovered. There may be few deposits as rich as those in the Klondyke district, but undoubtedly many will be found highly profitable, particularly when improved methods of working are introduced and the region becomes more easily accessible. be safely predicted, therefore, that the Yukon basin will continue, for many years to come, to contribute largely to the world's supply of gold; that it will be rendered accessible by the construction of railroads and that it will attract a limited permanent population in addition to that directly engaged in the development of its mineral wealth.

C. W. HAYES.

U. S. GEOLOGICAL SURVEY, Sept., 1897.

NOTES.

Systematic Observations of the Sun.—Superintendent Logan D. Howell, of Raleigh, North Carolina, contributed the following very timely article to the September number of the new North Carolina Journal of Education:

"If you wish to know how little children observe that are not trained to it, ask them a few questions about the apparent motions of the sun. This is the most conspicuous body in the heavens, and its movements north and south above our horizon cause a difference in the length of day and night during the year, increase and decrease of heat, and the change of seasons, and powerfully affect our lives.

"Yet few children have noticed that the sun changes its path

through the sky as the seasons advance. The most of them will tell you at any time of the year that the sun rises in the east, is overhead at noon, and sets in the west.

"September is a good month to begin systematic observations of the sun. For at the time of the equinox it does rise in the east and set in the west; but the children will be surprised to see it streaming in at the south windows at twelve o'clock. At noon, on or about September 21st, a permanent mark of the northern edge of the shadow of some fixed thing should be made so that it will remain for a year. In school rooms with a southern window a convenient shadow to mark is that cast on the floor by a window sill.

"By observing this shadow at noon once a week it will be seen advancing towards the north till about Christmas, showing that the sun is further south, and is rising less high each day. About December 22d, a permanent mark of the shadow should be made. After this date the shortening of the shadow will show the sun's return to the north, and its rising higher and higher each day until June 20th, when another permanent mark of the noon shadows should be made. It should be noted and recorded that the shadow on March 21st coincided with the shadow on September 22d.

"No child in school is too young to make these observations, and none are too old, if they have never done so.

"After learning that the sun does rise higher at some seasons than at others, the next question is, how high does it rise, and how low does it go? What is the extent of its journey? All this and more can be found out by means of a home-made instrument, which may be introduced about the fifth year.

"As this instrument shows when the sun turns at the tropics, it may be called a heliotrope, if you are fond of Greek. It consists of a flat piece of sheet iron cut into a quarter of a circle, a quadrant. On the circumference of this quadrant another strip of sheet iron, two inches wide, is soldered at right angles to the quadrant (that is, "square" to it). The whole thing is painted white, and on the concave surface (or inside) of the flange (or rim) 90° are marked off. The quadrant is fastened to a smooth piece of wood, and a pin, made of something like a knitting needle, or a lady's hat pin, is driven at right angles into the wood at the center

of the circle. (In order to get this pin exactly at the center, a bit of the corner of the quadrant must be cut off.) The part of the pin outside the wood is two inches long.

"This heliotrope must be fastened securely to a post or side of a window where the sun will shine full upon it at noon at all times of the year. It must point due north, with the concave side of the flange turned toward the noon sun. The pin must be in a plumb line above the zero mark on the flange.

"At noon the pin will cast a shadow on the quadrant and the flange, and the angle that this shadow makes with the plumb line between the pin and the zero mark can be read at once. This angle is equal to that between the sun and the zenith, which is called the vertical angle of the sun. For if the sun were directly overhead the shadow of the pin would fall at zero. For every degree south of the zenith the sun goes, the shadow of the flange travels up a degree.

"It will show that from the fall equinox to the winter solstice the sun sinks about 23½° towards the south. After that it comes back through the same space to the spring equinox, and continues to advance 23½° further to the summer solstice, when the sun stops and turns back. Of course, no good teacher will tell in advance what this thing is going to show about the sun; but, by a year's observation, the pupils will find out for themselves.

"By means of the heliotrope we can also determine our latitude. On September 22d and March 21st the sun is vertical at the equator. The pin there at that time would cast a shadow at zero. At one degree north of the equator the sun would appear then not directly overhead, but one degree south of the zenith. The heliotrope would show this. At Raleigh the shadow of the pin at the equinoxes falls at about 36°. This is because Raleigh is nearly 36° from the equator.

"The heliotrope is simple and easily made. Any worker in tin, iron or wood can readily understand the above description, and will make one at small cost. Almost any teacher can make one of wood, with a flange made of a thin flexible strip of wood or of tin or of stiff paste-board. But care must be taken to select wood that will not warp in the sun.

"The only practical difficulty may be in laying off the degrees.

But, using the following dimensions, it will be easy: Describe a quadrant with a radius of $14\frac{1}{3}\frac{1}{2}$ inches. The degrees on this circumference will be one-fourth of an inch. In laying off ninety degrees, errors may creep in because the tools are not delicate enough, or not accurately used all the time. But every fifteenth degree can be determined with close geometrical accuracy, and it is best to do this first in the following way:

"With the legs of the compass set for the same radius as the quadrant, place one leg at zero. The other leg will fall on the circumference at 60°. That fixes this mark. The 45° mark can be fixed by drawing a straight line between the corners of the quadrant, dividing it carefully, and drawing a straight line from the centre of the circle through this middle point and on to the circumference. From 45° to 60° is 15°. Set the legs of the compasses at this distance apart, and lay off the marks for 75°, 30° and 15°. These directions hold good for a quadrant of any size." R. E. D.

Venezuela.—Venezuela is divided into three zones, viz., the agricultural, 349,488 square kilometres; the grazing, 405,313, and the unexplored, or wooded lands, 797,940.

To the first division correspond the farms for coffee, cocoa, sugarcane, grains, etc. The cultivation of these lands does not amount to 300 square miles, and there yet remain for clearing and ploughing 13,350 square miles, which would increase seventy times, at least, the actual production.

The grazing section is covered with rich grasses; cattle and herds thrive plentifully and fatten with little attention on the part of the owners. In this belt exist the large stockyards supplying the farmers and markets with oxen for plough and nutriment.

The third section, or woods, yields the productions naturally obtained from the soil, as rubber, vanilla, sarrapia, copaiba, sarsaparilla, timber and precious woods which are excellent for building, tanning, textiles of several kinds, resins, balms and many medicinal plants, affording a vast field for business with little effort to industrious people.

Mountains.—There are three systems of mountains in Venezuela: the Andes, the Coast, and the Parima Ranges.

The Andes, trending from Pamplona, in the Republic of Colombia, towards the northeast, one branch of which extends to the Peninsula Goajira, and the other entering the State of Los Andes, mingles with the Coast Range.

The Coast Range runs parallel with the coast of the Caribbean Sea, and extends its branches to the interior of the sections Bolivar, Miranda, Carabobo, Cojedes, Yaracuy, Barquisimeto and Falcon.

The third, or Parima Range, begins in the interior of the State of Bolivar, traversing the country east and west, and forming the southern limit of the agricultural zone.

Seasons.—Properly speaking, there are but the rainy and the dry seasons in Venezuela, which are distinguished as winter and summer in the country. The arrival of the sun at the Tropic of Capricorn marks the first season, and when it enters the Tropic of Cancer, the second season begins. The rains fall from April to October, and at the same time the temperature rises. The rest of the year the weather is cool and pleasant.

During the dry season, or summer, the northeast winds are frequent, and they also blow from the north and northwest, being more common in November and December than in February or March. Rains fall during the same months, though not so copiously as in winter, and they are called "Northers."

Natural Products.—Venezuela is a very rich country as to natural productions. The territory includes gold, silver, iron, copper, lead, tin, colombine, marble and building stones, asphalt, salt, and many other mineral substances of undoubted richness. The mining laws of the country are very liberal and offer true guarantees and inducements to explorers and investors.

The cultivation of coffee, cocoa and sugar-cane are the main agricultural industries of Venezuela. It can be said, however, that almost all the products of the world can be cultivated, owing to the fertility of the soil and its variety of climate, as, for instance, corn grows as well as wheat, and all kinds of vegetables can be raised, as well as cotton, tobacco and India rubber.

The forests of the country abundantly contain medicinal plants as sarrapia, quinine, sarsaparilla, copaiba, cola nuts, copal, coca, musk seed, mustard, tamarind, etc., and the vegetation is so

marvelous that the milk, water and bread trees are found as a matter of fact.

In regard to timber it can also be said that all kinds are found in this country, amongst them mahogany, cedar, oak, gateado (Astronium graveolens), pardillo (Cordia gerascanthus), rose wood, box, vera (Guayacum arboreum), ebony, gold wood, bombax, Brazil wood and many others. The natives inhabiting the surroundings of the forests can furnish themselves with wine, vinegar, starch, oil, etc., and also can build their houses and manufacture baskets, hammocks and other necessary things from said forests.

Other productions may be mentioned, like wax, greases, honey, etc. Sericulture has been successfully attempted. The tortoise shell is plentiful around the western coast, and there are deposits of mother of pearl in Nueva Esparta.—Compiled from The United States of Venezuela, New York, and An Illustrated Guide to Caracas, Caracas.

The Seasons in India.—In Nature for June 3, 1897, occurs a very helpful article on Periodic Variations of Rainfall in India, in which appears the following excellent summary of the conditions of the two seasons.

"The year in India may be broadly divided into two seasons or monsoons, viz., the northeast monsoon and the southwest monsoon. These names are derived from the direction of the winds prevailing in the Arabian Sea and Bay of Bengal during the two periods. They are inapplicable over the greater part of India, where the winds are from directions nearly opposite to those indicated by the names of the seasons, and are chiefly determined by the axial directions of the local river valleys. Thus the winds in South Bengal are from the southeast, and in Bihar from east, during the southwest monsoon, and are from the opposite directions in the northeast monsoon. It would hence be more appropriate to call the two seasons in India the dry monsoon and the wet monsoon from their most characteristic features.

"The dry monsoon, or season, usually commences in November or December, and continues until May. Winds of land origin prevail more or less steadily in the interior, and hence the period is usually marked by great dryness of the air and little or no rain.

The first three months of this period (December to February), characterized by a comparatively low temperature, are known as the cool weather season; and the second three months (March to May), when the temperature increases rapidly and culminates in a period of excessive heat in May, as the hot weather season. During the cold weather season, shallow depressions of large extent, the majority of which form in Persia, enter India from Baluchistan and traverse northern India from west to east, distributing light rain in the Indo-Gangetic plains and heavy snow over the western Himalayas. The severity of the hot weather season is occasionally relieved by the occurrence of series of thunderstorms and duststorms, which cool the air for brief periods. Over nearly the whole of the interior of India the cold weather and hot weather disturbances occupy a very small portion of the period, and the characteristic features of the dry season are persistent dry weather, with clear skies and large diurnal range of temperature.

"The chief crops in northern and central India during this period are wheat, barley, linseed, etc., and irrigation from canals, tanks or wells is essential in almost all districts for their successful cultivation. If the summer rains cease much earlier than usual, it is not possible to plough and sow the higher and drier lands, and the area of cultivation in the dry season under these conditions is hence largely diminished. If the winter rains are light and scanty the crops are more or less severely affected on all the higher lands, where irrigation from wells, etc., is necessarily limited.

"The rains of the wet season set in suddenly on the west coast of India in the first week of June, and a little later (in the second or third week of June) on the Bengal coast, and extend more or less rapidly into the interior. The prevailing winds of this period are of oceanic origin, and are, in fact, the northward extension of the winds of the southeast trade.

"The extension of these winds northwards across the Equator and up the Indian Seas usually begins in the third week of May and gives a complete and permanent change of weather (lasting for five or six months), more especially over the land area of India. The winds due to the extension of these massive humid air currents usually begin to give daily rain to the Malabar coast in the

last week of May, and to the Bombay coast on June 4 or 5. The humid currents advance more slowly into the interior, but are usually established before the end of the month over the whole of India. Cloudy, showery or rainy weather, with a moderately high temperature and small diurnal range of temperature, prevail during the next three months, which are in a striking contrast to the excessively hot and dry weather that has prevailed during the previous two or three months."

The Formation of Dew.—"But whence comes the dew? It does not fall from the air. Whence comes it, then? We shall see. Ground a little below the surface is always warmer than the air over it. As long, then, as the surface of the ground is above the dew point, vapor must rise and pass from the land into the air. The moist air so formed will mingle with the air above it, and its moisture will be condensed, forming dew wherever it comes in contact with a surface cooled below the dew point. In fact, dew rises from the ground.

"Place some metal trays over the grass, the soil and the road on dewy nights. You will generally find more moisture on the grass inside the trays than outside; you will always observe a deposit of dew inside the trays, even when there is none outside at all. This shows that far more vapor rises out of the ground during the night than condenses as dew on the grass and other objects.

"Pieces of iron lying on the grass are soon surrounded with richer grass, on account of the moisture which the cold metal attracts from the rising water vapor. Travellers in Australia and South Africa state that they often found the under side of their bedding placed on the ground to be wet after camping out at night. I remember when walking in the vicinity of Hexham with an acute observer, trained to farming, that on my remarking that the farmers might, to their profit, remove the extraordinary quantity of small stones from the field in order to give room for the growth of grain, he shrewdly said: 'These stones collect moisture from the ground; the soil is thin, with a gravelly subsoil, and unless the maximum amount of moisture be collected (which can only be done by allowing these stones to remain) there would be a very deficient crop. They must not, therefore, be removed.'

"Dew, then, rises from the ground. But how is the dew formed on bodies high up in the air? If the dew comes out of the ground, should it not be found on bodies only exposed to the earth? Now, dew does not rise in particles, as it was once considered to fall in particles like fine rain. It rises in vapor. is caught by what is on the surface of the earth, but the rest ascends in vapor form until it comes in contact with a much colder surface to condense it into moisture. The vapor does not flow upward in a uniform stream, but is mixed in the air by eddies and wind currents, and carried to bodies far from where it rose. fact, dew may deposited, even though the country for many miles all around be dry and incapable of yielding any vapor. In all such cases the supply of vapor to form that dew would depend on the evaporation of the dew, and on what was wafted over by the wind.

"But the most practically convincing proof of the rising of dew from the ground is in the form of hoar frost or frozen dew. has been a bright, clear, sunny day in January, with no snow on the ground, look over the garden, grass and walks on the morning after the intense cold of the night; big leaves may be found scattered over the place. You see little or no hoar frost on the upper surface of the leaves, but turn up the surface next the earth, or the road, or the grass, and what will you see? You have only to handle the leaf in this way to be highly astonished. white coating of hoar frost, as thick as a layer of snow, is on the under surface. Leaf after leaf will present the same appearance. If a number of leaves have been overlapping each other, then, there will be no coating under the top leaves; but when you reach the lowest layer, next the bare ground, you will find the hoar frost on the under surface of the leaves. Now, this is positive proof that the hoar frost has not fallen from the air, but has risen from the And hoar frost is, as we have said, frozen dew.

"Dew, then, mostly rises from the ground, and what used to be thought dew is the active exudation of the healthy grass. These two facts are now established. Brilliant globules are produced by the vital action of the plant, showing life in one of the most charming forms in the phenomena of Nature."— Wakefield (Eng.) Express.

Good Geography Teaching.—Professor Charles R. Dryer closed an article on Geographical Spheres and Relations in the *Inland Educator*, for September, with a short paragraph, in which he summarizes the differences between good and bad geography teaching as follows:

"All geography has two phases: (1) descriptive or distributive, and (2) relational or scientific. As long as the teacher's questions all begin with what? or where? he may be doing good and necessary work, but it is in the purely descriptive phase. He is calling upon his pupils for nothing but the exercise of memory, and they are acquiring more or less useful information. When he proceeds to ask how? or why? his teaching passes into the scientific phase, he is calling upon his pupils for the exercise of judgment and reason, and they are acquiring wisdom and power. To know scientifically is to know causally, to know the reasons for things."

Climate of Australia.—From the very nature of its superficial configuration, continental Australia has but a scant rainfall and, owing to the same national causes, it is very unequally distributed. If the total annual rain fall of the whole Australian continent were equally distributed over the entire area, it is doubtful if it would aggregate as much as six inches. The reasons are obvious. Owing to the rotary motion of the globe, the rain clouds, or vapor-laden atmosphere, come chiefly from the eastern seas or basins of evaporation. In every quarter of the globe, the distribution of the rainfall depends upon local influences, chiefly upon mountain chains or land elevations. Some 50 or 100 miles from the coast, and almost parallel therewith, a chain of mountains, or high table-lands, runs along the whole east side of the continent, from about 12° to 38° south latitude, having a total length of nearly 1,500 miles.

While these ranges are low (they average 4,000 or 5,000 feet) as compared with the great mountain chains of other countries, they are sufficiently high to empty the westerly moving rain clouds of most of their rather meagre supply of moisture.

In a comparatively small area, east of the higher portions of this range, there is quite a heavy rainfall. There is also a district in tropical Australia, west of the Gulf of Carpentaria and north of the

Raper river, embracing some 30,000 square miles, having an annual rainfall of from 40 to 50 inches.

A semi-circular belt of country, some 400 miles wide and over 2,000 long, lying west of the above mentioned coast range and south of the north shore line, has an average annual precipitation of from 10 to 30 inches, the amount gradually decreasing to 5 inches and less towards the interior. Fully one-half of the vast interior of the continent of Australia, a country with a superficial area of nearly 1,500,000 square miles, may be said to be almost rainless.

The enormous pastoral industry and the princely sheep runs—called in Australian speech "stations"—are inside the mountain range and reach out to the dry and withered plains in the semi-circular belt with the scant rainfall before described. As it will be observed that the highest average rainfall in any of these interior regions is but a few inches, the loss and distress in a country usually stocked up to the possibilities of the most favorable seasons, caused by the failure of the meager supply of rain, may be esily imagined. Inside of this coast range, in the continental interior and bordering on the dry and rainless plains, are pastured the 100,000,000 sheep and most of the 10,000,000 cattle of Australia.—Consular Reports, September, 1897.

Constantinople.—To begin with, there is no specific city on earth named Constantinople.

This opening statement would seem to render an article upon the above topic superfluous, but not so. Constantinople is a generic term and embraces a number of cities on either side, and at the south mouth of the running Bosporus (not Bosphorus). That beautiful salt-water river empties into the Sea of Marmora just as it unites with the Golden Horn, and the union of the two forms the splendid harbor of the united cities. On the Asiatic side are Kadikeui, Scutari and Kouskounjouk. On the European side are Stamboul, Eyoub, Galata, Pera, Tophane and Beshicktash.

Constantinople bears the same relation to this cluster of cities that Greater New York does to the cluster at the south of the Hudson. Each of these cities has its own post-office—and many of them several—as the various foreign governments each have their own offices. While living there I kept a supply of Turkish,

French, English, Russian and Italian stamps for use.—Inland Educator, October, 1897.

Johannesburg.—Founded in 1886 as the center of the Witwater gold fields, the town of Johannesburg contained only 3,000 inhabitants in April, 1887. Since then the growth has been rapid, until now it is the second largest city of Africa, the inhabitants of the town itself and its immediate neighborhood numbering in July, 1897, 102,078. It is essentially a mining population, males greatly predominating, and 63 per cent. of the people being between the ages of 15 and 30. Only 6 per cent. of those capable of exercising political rights possess the franchise and only $1\frac{1}{2}$ per cent. of the total population.—Dr. Supan in Petermann's Mitt., Bd. XLIII., No. 2.

The End of the Alps.—The Lammbach catastrophe in the Bernese Oberland has called forth the following calculation: The Aare carries annually 177,000 cubic yards of detritus to the Lake of Brienz, thereby constantly displacing its bank. In about thirty-five to forty thousand years the lake will be entirely filled up. From every square mile of the basin of the Aare above Meiringen, nearly 22,900 cubic feet of rock are swept down the valley every year, and the mountains will thereby be lowered one foot in about 1,016 years. As, then, the sources of the Aare lie 7,414 feet above sea-level, in about seven and a half million years the Aare glaciers will have disappeared and the valley be reduced to a uniform level.—Scot. Geog. Mag., Vol. XIII., p. 203.

The Highest Alpine Villages.—The loftiest village in Switzerland is Inf in the valley of the Avers, 6,996 feet above sealevel. In Italian territory, south of Monte Rosa, Rery is 7,055 feet above the sea and its inhabitants live at that elevation the year round. The village of Trepale (Italian) in the Val Livigno is 6,771 feet above sea-level. Avérol (elevation 6,661 feet) and Saint-Véran (elevation 6,628 feet) are both in the French Savoy. (Deutsche Rundschau für Geog. und Statistik, No. 5, Vol. XIX.) All of these villages are higher above the sea than the summit of Mount Washington.—Bull. Am. Geog. Soc., XXIX., 2, June, 1897.

Population of Egypt.—The census of Egypt taken on June 14th, showed a population of 9,700,000, an increase of 2,900,000 since 1882; in other words, a gain of 42 per cent. in fifteen years.—Evening Post, N. Y.

Population of Russia.—A census of the Russian Empire was taken on February 9th, none having been taken since 1851. The total population is now given as 129,211,113, having about doubled in a period of forty-six years.—Science, June 25, 1897.

REVIEWS.

Asia. By Frank G. Carpenter. American Book Co., 1897. Pp. 304.

The author of the geographical reader whose title is noted above, has had unusual opportunities for gathering facts concerning the people of Asia "as they are found in their homes, on their farms and in their factories." He has traveled thousands of miles through Asiatic countries, and much of the book was written amid the scenes described.

The chief merit in Mr. Carpenter's book lies, we think, in the fact that it bears no marks of special "reading up;" instead, he writes with a knowledge born of acute observation and a charm prompted by a ready appreciation of what his curious young American readers would like to know about their Oriental kinsfolk and the country they live in. We are sure that many teachers will find the book usable as a reader on account of its simplicity as well as its vivacity. The illustrations are generally good and many of them unhackneyed.

In a book of so many excellencies it may seem ungracious to pick any flaws; still we feel that the teacher who is trying to keep abreast of the present effort to improve the teaching of geography will be disappointed in Mr. Carpenter's present contribution. We look in vain for any relation between the life of the people and the physical features of the country in which they live. From the preface we think we have a right to expect this, for the author says that in the description of each country he has aimed "to leave

a complete whole in the mind of the pupil, giving him the things he should know concerning it."

We are told that the whole of Japan was once covered with volcanoes and that the one-tenth of the country which is now under cultivation produces enough to feed the entire population; but no suggestion is given of the fact that the old lava flows have been so thoroughly masticated by the weather that the soil contains an inexhaustible store-house of fertility. If he had told us that the "black" or "cotton soil" of the Deccan owed its remarkable fertility to the same fact, and that our extensive lava flows in Idaho are so barren because they are so recent, so undigested, as it were, we should have put a girdle round the earth in less than forty minutes which would have shown us something of the stages in the processes of nature which have been and still are working to support life.

Again, Mr. Carpenter tells us that in the great wheat-growing plains of Siberia "the soil is as black as your boots," a fact of little educational value and one that would soon be forgotten. Had he drawn a parallel between the "black earth of Siberia" and Russia, the fine-grained loess of China, and our own black prairie soil, not only as regards character and position, but as well with regard to the control such a feature exerts on the life of the inhabitants, he would have given a lesson on the dependence of life on the sculpture of the land which modern geography is trying to teach.

We think that he has made a mistake in comparing the small islands of Japan to "a good sized farm." It would be interesting to know what idea of the size of these islands a Dakota boy would have as compared with a boy from New Hampshire.

We object decidedly to Mr. Carpenter's use of comparisons to gain a concept of surface features. To compare the North Pacific Ocean to a liquid wedge is bad physics and still poorer pedagogy; but this is not so bad as the way he has treated Japan. To liken this Island Empire to a Snake with a capital S, and then to say that it flaps its tail on the Tropic of Cancer, is an insult to the snake as well as to Japan.

The publisher's work has added much to the general attractiveness of the book, for the type is clear, the shape convenient, and the illustrations true and well selected. The book is more suited to the middle than to the upper grades of grammar schools, and yet is a book that it would be well for many men and women to read. The words Asia, and particularly China, bring to the minds of many people absurd suppositions and preconceptions that are far from true. This book will help in producing sane mental conceptions of the so-called Antipodes, and deserves a general use.

C. W. H.

The Oswego Normal Method of Teaching Geography. By A. W. FARNHAM. C. W. Bardeen, Syracuse, N. Y., 1896. Pp. 127.

Many little books and pamphlets appear from time to time devoted to Method in Geography Teaching. Some are well known and widely used, others are more local in their use and rightly so. The book before us is one of the newer bound volumes on Method. While we believe that method books are liable to be but aids for the lazy and poorly prepared teachers, we feel that certain books of this class contain much of value. No scheme of work can be adopted in toto by every teacher, for each teacher must choose, recombine and amplify the items published in the method manuals, or become a mere imitator. Mr. Farnham presents his lesson in a very diagrammatic way, and summarizes occasionally, in small sentences, truths that a teacher should expand with great care to have them valuable to a child. The book opens with a scheme for the study of Home Geography that is full of suggestions, but which fails to bring out certain physical relations that young children delight in—relations of man to the earth causally. The chapters on Mathematical Geography are good, but in some cases the children are called upon to "state" things they may not, according to the plan, have been led to understand. Any teacher would find this book helpful, but the order of chapters should be re-arranged to secure the most rational progress. The list of reference books given is good, and shows that the author is in touch with most of R. E. D. the best books of recent issue.

THE

JOURNAL OF SCHOOL GEOGRAPHY

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THE CLIMATIC CONTROL OF OCCUPATION IN CHILE.

One of the most interesting of the many relations which exist between climate and man is that which concerns the climatic control of human occupations. This branch of anthropo-climatology, as the writer has recently named this study, is one with which every teacher of geography is more or less familiar. A thorough study of the geography of the United States, for instance, certainly involves some consideration of the effects of climate in favoring the growth of cotton in our Southern States; of oranges in Florida and California; of wheat in some sections and of tobacco in others, thus controlling in a definite way, the occupations of the inhabitants of these various regions. Where the rainfall is too small for successful agriculture, as over parts of our western plains, grazing is the chief occupation of the people, and where climatic conditions are favorable to forest growth, as in parts of our Northwestern States, there lumbering takes a front rank in the list of occupations. A climate too cold or too dry for even a moderate growth of vegetation, eliminates agriculture entirely from its position as one of the most important of human occupations, and fishing in the first case, or the nomadic life of the desert in the second, may take its place.

This climatic control over occupation, although almost always a noticeable fact, becomes especially so where there are marked climatic contrasts within short distances. Then even a casual observer can hardly fail to see that marked differences in climate usually mean corresponding differences in man's occupations. One of the most interesting examples of this relation is to be found in the case of Chile, and the writer is prompted to call to the attention of the readers of this JOURNAL some of the striking facts in this connection which have impressed themselves strongly upon his mind during a recent visit to that country.

The key to the climatic contrasts which Chile exhibits between the desert region of Atacama in the north, and the abundant rainfall of its southern extremity in Tierra del Fuego, is to be found chiefly in the presence along its western border of the great Darwin was quick to perceive that mountain chain of the Andes. this range presents the interesting phenomenon of having its eastern slopes well watered and its western slopes dry in the latitude of the prevailing winds. Thus we find nearly all of South America south of the equator and on the eastern side of the mountains, in the southeast trade wind region, well watered. The rainfall naturally decreases from the coast inland, and where the land is low, and far from the ocean, there is but little rain. however, no extended desert areas, as in South Africa and Australia, and as soon as the winds reach the eastern base of the mountain, and are compelled to climb, the rainfall rapidly increases again.

In the trade wind latitudes on the western, or leeward coast, we have the dry and barren regions of Peru and Chile. From lat. 4° S. as far down as about lat. 30° S., the western coastal strip is either practically rainless, or has only an extremely small rainfall. But south of lat. 30° S., on the west coast, we begin to come into the region of the prevailing westerly winds, and the rainfall at once increases, the increase becoming greater and greater with increasing latitude, until at about lat. 38° S., we enter a zone of heavy rainfall. In these same latitudes on the eastern side of the Cordilleras, however, the rainfall decreases as a whole south of lat. 30° S., and while southern Chile has more than it needs, the plains on the eastern, or "rain-shadow" side of the mountains are largely

left dry. As on the Pacific coast of the United States, the rainfall decreases rapidly from north to south, Sitka having a mean annual rainfall of over 110 inches, San Diego less than eleven inches, and Lower California being practically rainless, so also in Chile, in going from south to north (this being in the Southern Hemisphere), we note a very striking decrease in rainfall. The dominating causes in both cases are the same, and the seasonal occurrence likewise. At Ancud, on the island of Chiloe in southern Chile (lat. 41° 46′ S., long. 74° 01′ W.), the mean annual rainfall is (roughly), between 100 and 125 inches; at Valparaiso (lat. 33° 01′ S., long. 71° 40′ W.), it is between ten and twenty inches, and at Copiapo (lat. 27° 22′ S., long. 30° 22′ W.), it is less than half an inch.

It is to be expected that such great difference in rainfall should exercise an important control over the occupations of the inhabitants, especially over such occupations as are directly connected with agriculture. For where, as in the northern provinces of Chile, there is practically no rainfall, agriculture on a large scale is impossible, and vegetable life can only grow in those restricted localities where irrigation can be resorted to. other hand, in the far south, where the abundant rainfall is favorable to the growth of forests, we shall expect to find that lumbering plays an important part in the life of the people. In the region midway between these two extremes, where there is neither an excess nor a deficiency of rainfall, agriculture will naturally be profitable and will constitute the chief occupation. Our expectations in these matters we find fully verified. In southern Chile, up to about lat. 41°S., which includes the region of heaviest rainfall, there are extensive forests as yet hardly attacked by man, and lumbering and fishing are the chief occupations. In northern Chile, north of lat. 27°S., where the barren nitrate fields replace the green valleys and the vine-clad hills of the more favored districts further south, the nitrate industry and mining of various sorts are the chief and almost the sole occupations of the people. Between latitudes 27° and 41° S., over most of which region there is sufficient rainfall for the growth of crops, although irrigation is necessary in many parts, comes the agricultural zone proper. In the northern districts of this zone, where the rainfall is very small, mining becomes of importance; and in the southern districts, near the zone of heavy rainfall, lumbering becomes one of the chief occupations. In this agricultural zone, cattle-raising is also an important occupation, large numbers of cattle being shipped to the northern parts, notably Iquique, where the lack of vegetation precludes the raising of herbivorous animals. Indeed the so-called "nitrate ports" have to import almost everything in the way of food, this fact furnishing a very pretty illustration of the control of climate over imports.

We must, of course, be careful in any such consideration as the present, not to over-emphasize the influence of climate, pure and simple, over human occupations. Other factors, such as the geological character and the present topography of a region, are often the controlling influences in determining what the occupations of the inhabitants shall be, although climate almost always plays an important part. Thus, for instance, the great industry of the Argentine, cattle-raising, is possible on the immense grassy stretches of the pampas, not alone because the climatic conditions there are favorable for the abundant growth of grass and for a sufficient water-supply, but because the recent even elevation of these young marine plains above sea-level has added to South America vast tracts over which numberless herds of cattle can roam. In northern Chile, to note another instance, it is the geological history of the region, combined with past and present climatic conditions, which determines the presence of the nitrate and other deposits that make these desert tracts of such great commercial value. The simple climatic fact of lack of rainfall at the present time makes agriculture, except on a small scale where irrigation can be employed, impossible in northern Chile. rainfall more abundant, farming would undoubtedly become one of the chief occupations, but an increase of moisture would probably mean the destruction of the nitrate industry. This region, then, is one in which human occupation is peculiarly controlled by climatic conditions.

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GENERAL FEATURES OF THE CANADIAN ROCKIES.

The Rocky Mountains of Canada constitute one of those comparatively new parts of our continent which have special interest by reason of the grandeur of the natural scenery. The completion in 1886 of the Canadian Pacific Road opened up this wilderness to tourists, since which time the mountains, forests, and lakes of British Columbia and Alberta have been the admiration of travellers from all parts of the world.

After entering the mountains from the flat plains of Assiniboia the railroad is almost constantly hemmed in by high peaks, or lost in the depths of gloomy canyons, throughout a distance of four hundred miles, till the Pacific coast is reached. Even there at the western border of the continent, the mountains appear to rise from the sea, while the land-locked bays and narrow fiords seem like flooded valleys in a sinking land. In this journey from plains to sea, the entire system of the Rocky Mountains is crossed, and the observing traveller will notice that there are in all four pretty well defined ranges. Of these the Coast Range and the Gold Range are nearest the sea, and are characterized by mountains of low or moderate elevation, generally covered by coniferous forests nearly or quite to their summits. The streams and large rivers have cut deep channels through the rocky strata, and have made gloomy canyons in the process, so that the country was formerly, and is now to a great extent, very difficult to traverse. It was here in these two ranges of British Columbia that the greatest engineering difficulties were encountered when the railroad was building.

The third range from the coast is the Selkirk Range, justly celebrated among mountaineers as the "Switzerland of America." In this range the highest peaks attain an altitude of about 11,000 feet. The rocks are schists and quartzites of the oldest geological formations and have been carved out into domes and pyramids of striking forms and appearance. The valleys are clothed in a dark green covering, a dense coniferous forest of cedar, hemlock, spruce and pine. The humidity of the climate caused by the damp air currents from the Pacific passing over the lofty mountains, is the reason why these forests are so dense and luxuriant. In fact, the undergrowth of ferns, alder bushes and the prickly Devil's Club,

combined with the moss covered tree trunks here and there lying prostrate in the forest, offer an almost impassable jungle to the explorer travelling with pack-horses. The very great precipitation in winter accumulates in snow-fields of considerable area on the higher parts of the mountains, and from these reservoirs glaciers descend into the valleys to an altitude of 5,000 feet above sea level. The contrast in color and form between the dark green forests of the valleys, the pure snow and blue ice of the glaciers, and the brown or iron-gray cliffs of the higher peaks, gives an ensemble of mountain beauty and grandeur comparable to that of the Alps or Caucasus.

The fourth and last range is nearly four hundred miles from the Pacific coast. Its mountains rise in sheer cliffs and escarpments direct from the plains and tower up in sullen walls of rock from three to five thousand feet above their bases. This range of the Rocky mountains proper is frequently called the Summit Range. The highest crest forms the divide or watershed between the rivers that flow into the Atlantic and those that drain into the Pacific, and is also the boundary between the Canadian provinces of British Columbia and Alberta. These mountains are in many respects quite different from the Selkirks and the other ranges to the west. The mountains are higher and more rugged, reaching altitudes of nearly 12,000 feet; the snow-fields and glaciers are even more extensive than those of the Selkirks, while the forests are far less dense and the trees smaller in size. The nature of the rocky strata in the Summit Range is also much different from those of the other mountains. The rocks are sandstones, shales and limestones, disposed in very clearly marked layers, sometimes horizontal, but frequently tilted up at all angles and contorted in complex folds. Wherever the mountains are made of horizontal strata the weathering has produced curious natural monuments and sharp pinnacles of strange and fantastic forms, while very often an entire mountain resembles some ancient castle with towers and battlements, imitating in appearance the works of man with striking fidelity. Standing on a high elevation in this range, the mountains appear as long ridges of rock with very few isolated peaks, so that the general impression given by the successive ridges and valleys as one looks over a vast extent of country to a

distance of perhaps one hundred miles, is that of a stormy sea in which the mountains represent colossal billows.

Every one of the four ranges is made up a number of subranges, more or less distinct from each other, while even the subranges are divided into minor ridges of less importance and individuality.

Having now taken a brief review of the general features of the Canadian Rockies it would perhaps be well to make comparisons with other parts of the great Cordilleran System. This system in the latitude of Colorado is no less than one thousand miles in Extending too, from the center of Mexico (for in recent years the mountains of Central America and the Andes have not been regarded as continuous with the Rockies of North America) to the Arctic Ocean, the very greatest diversity of climate and features naturally results in so vast a system. The lofty granitic domes of the Sierras and the barren summits of Colorado attain altitudes of more than 14,000 feet but the dryness of the climate gives little perpetual snow and nourishes but a scanty forest. Extensive areas of land exist among the several ranges of our Western States which have nearly the aridity and barrenness of true deserts where alkali ponds and salt lakes give proof of the small annual rainfall.

What could be in greater contrast to this state of things than the mountains of Alaska covered with perpetual snow, obscured by nearly constant fogs and clouds, and flooded by fields of ice and glaciers of vast extent? The Rocky Mountains of southern Canada have not the lofty grandeur of the St. Elias Range in Alaska nor of the Sierras in California, while their climate is a mean between the reeking humidity of the one and the desert dryness of the other. The Cordilleran System becomes perceptibly narrower as it runs northward from Colorado till at the International boundary it is only about four hundred miles in width. From this point on, the several ranges have a direction nearly northwest and southeast, or parallel to the Pacific coast.

Turning now to a consideration of the most important features of the Canadian Rockies in somewhat greater detail let us take up first the glaciers, rivers, and lakes of these mountains. As has been stated above, there are very extensive fields of snow in this

part of the mountains, and from them descend glaciers which are often four or five miles long by half a mile or more in width. the Selkirks the glaciers descend as low as 5,000 feet above sea level, but in the Summit Range they rarely reach 6,000 feet. From the glaciers large streams of muddy water descend and give rise to the principal rivers. The Saskatchewan, the Athabasca, the Peace and without doubt all the rivers further north take their origin and receive their principal water supply from glaciers. the accumulation of water from every branch valley, each bearing its own glacier, or perhaps several of them, the rivers increase rapidly in size and even at a few miles distance from their sources become wide and deep and carry such a volume of water as would equal that of many of our larger eastern rivers. Another peculiarity of these streams is that they reach their flood heights in hot, dry weather, while storms have the apparently paradoxical effect of making the rivers fall. In view, however, of their sources in snowfields and glaciers where hot weather causes rapid melting and cold rain storms arrest the process, this result seems quite natural.

The mountain valleys abound in ponds and small lakes, usually of very clear water, deeply colored blue or bluish-green, and, as they are usually surrounded by deep evergreen forests, or hemmed in by cliffs and rugged mountains, these little lakes form one of the most beautiful and picturesque features of the Canadian Rockies.

The vegetation of the Canadian Rockies is quite luxuriant and serves to add one of the principal elements of beauty to the grandeur of the snowy peaks. All the valleys are clothed with evergreen forests up to an altitude of 7,000 feet, which is considered the tree-line in this latitude. There are very few deciduous trees, and in fact the entire flora indicates a cold climate and a short summer season. There are of course many varieties of shrubs and herbs, some of which have beautiful blossoms and which decorate the open space in the forests or the grassy meadows of higher altitudes. The higher one goes the more beautiful do the gaudy Alpine flowers become. Some of these pretty plants endure the cold at 3,500 to 9,000 feet above the sea level.

In summer time, especially after a long period of dry weather, the forests are very subject to fire. About one-fourth of the entire timber lands of the mountains have already been destroyed by fire. Carelessness on the part of camping parties and hunters is the cause of many destructive fires, but they are often maliciously started by prospectors in order to clear the land. The atmosphere is full of smoke nearly or quite half the time in the summer months, and nothing is more exasperating to the camper out than this nearly constant haze which veils the mountains. Though these forests fires have been, of course, more frequent since the advent of white men, there are indications under old trees and deep in the soil that forest fires raged in these mountains many hundreds or even thousands of years ago. Perhaps aboriginal man was the cause of these fires, but it is more likely that during thunderstorms some tree was struck by lightning and fired, as has been seen to happen in recent years.

The animal life and game of the mountains is not especially abundant. The very short summer, the very long and severe winter, and the scarcity of certain vegetable products make the region unfavorable to animal life. The deer tribe is represented by several different varieties, but they are rarely seen by the hunter. Black and grizzly bears are more abundant. The Mountain Sheep or Bighorn roves in flocks in the foothill country and are occasionally found among the meadows of the high mountains, but these animals are far less common than formerly. One animal, the rocky mountain goat, in reality a species of antelope related to the chamois of Switzerland, has held its own, if on the other hand it has not actually increased in numbers of late years. The rocky mountain goats run in small herds, or sometimes solitary, above tree-line at about seven or eight thousand feet altitude, where they find abundant food on the grassy slopes of the mountain sides.

There are a considerable number of birds, among which the several varieties of grouse and ducks are most serviceable to the explorer for food. The smaller rodents, the squirrels, marmots, and picas live in considerable numbers all through the mountains especially near the tree line. The number of swamps and the comparatively moist climate are favorable to mosquitoes, which in these mountains, as in all northwestern Canada, are a terrible plague.

The climate of the Canadian mountains is dependent mostly on the altitude of the valleys, which is from four to seven thousand feet above the sea, but it is also dependent on the latitude and the proximity to the Pacific Ocean. In summer, during the hottest period of the day, the temperature sometimes reaches 80 degrees, but the dry, light mountain air makes this temperature very easily Immediately after the setting of the sun, the atmosphere becomes rapidly cooler, and by morning the temperature is never higher than 40 or 50 degrees and often reaches several degress below freezing even in July and August. The summer season is generally attended by long periods of dry fair weather only marred by the presence of forest fire smoke. Rain occurs mostly in brief but violent thunderstorms attended by high winds. clouds settle down on the mountain sides or even reach into the lowest valleys while the rain lasts, and afterwards when the storm is breaking up the cloud effects are wonderfully grand and impres-After a rain storm the sky appears of a remarkably deep blue, and the most distant mountains stand out distinctly in the limpid atmosphere without a trace of haze. The line of perpetual snow is about 7,500 feet, judging by the limits of névé on the gla-In shady places snow lingers all summer at this height. Lakes remain covered with ice till June at low altitudes, but above 7,000 feet the last ice does not disappear till between the 1st and 15th of July.

The winter climate is very severe. Minimum temperatures of 30 and 40 degrees below zero are not uncommon, and driving snow storms sometimes continue for ten days or more at a time. The snow rarely reaches a depth of three feet in the valleys, but on the higher parts of the mountains the depth of the total winter snowfall is probably between twenty and forty feet, though the depth of snowfall varies from place to place in a remarkable manner. The highest ridges always receive by far the greater amount of snowin winter and of rain in summer.

The Rocky Mountains of Canada differ from the mountains further south, then, in several ways. In Colorado and the Sierras the valleys are generally from seven to eleven thousand feet in altitude, with many summits over 14,000 feet above sea level. In the Canadian mountains the highest peaks reach only a little over 11,000 feet. Mt. Assiniboine, a sharp rock peak in the Summit Range about 150 miles north of our boundary, is the highest moun-

tain, so far actually measured, in all southern Canada. Nor are there any peaks in the neighborhood of the Athabasca Pass more than 12,000 feet in height, notwithstanding the fact that our best maps of North America have accredited Mt. Brown and Mt. Hooker with heights of about 16,000 feet in that region.

The greater humidity of the climate in the Canadian mountains causes the forests to be much richer than in our part of the Rockies, while the snow fields and glaciers are incomparably more extensive. The natural scenery of the Canadian Rockies is excelled by no other part of our continent. It must not be inferred that the Sierras and Colorado mountains are more imposing because they are higher. Gentle slopes, little perpetual snow, and thin forests offset the advantage of mere altitude.

On the other hand the Canadian Rockies are characterized by narrow and deep valleys hemmed in by sheer cliffs and precipices rising in solid walls of rock thousands of feet in one mighty leap. Add to this the depth and extent of perpetual snow, the pure white ice of the glaciers hundreds of feet thick clinging to narrow shelves on the mountain sides, and the contrasted beauty of the richly forested valleys, adorned by sparkling streams, beautiful waterfalls and lakes of exquisite coloring, and only then shall we have any clear idea concerning one of the most attractive regions of the world.

The scenic charms of this region are rapidly becoming better appreciated among travellers and in a few years the Canadian Rockies will in all probability be one of the favorite resorts of the world for mountain climbers and those who delight in the grandeur and beauty of nature.*

WALTER D. WILCOX.

*For further information on these mountains refer to fully illustrated book by the same author entitled: "Camping in the Canadian Rockies," with twenty-five full page photogravures and many text illustrations. (G. P. Putnam's Sons. 1896.)

NORTH CAROLINA.

(Continued from page 266.)

Animal Life.—All the animals common to the eastern United States are met with here. In the mountain region are found many creatures peculiar to the Canadian zone and to the northern part of New England. Among such may be mentioned the Canada lynx and the red squirrel or boomer of our mountains. The swamps of the eastern and the mountains of the western section afford shelter for the bear, the wild-cat and occasionally a cougar. The swamps have also otters and muskrats, with alligators in the southeast. The wolf is common in the mountains, and the fox is found throughout the State. Deer, opossums, raccoons, squirrels and rabbits are abundant. Even the beaver it occasionally met with in the Piedmont country.

Eagles, owls, hawks and the wild turkey are found throughout the State. The Carolina paroquet was originally found in the State, but it has been many years since one was taken in North Carolina. The Carolina snow bird, the solitary vireo, winter wren and red breasted nuthatch are found in the mountains, and in the valleys of that region the ruffled grouse is common. Humming-birds are common in the eastern and middle sections, and here occur numerous birds noted for the sweetness of their song—the wren, thrush, mocking-bird and lark. Swans and geese, brant and wild ducks are found along the coast in winter months. Inland are quail, woodcock, snipe and sora (Carolina rail).

The reptiles are not abundant, nor are many of them dangerous. Alligators are not infrequently taken in the eastern part of the State. The common rattlesnake occurs in the mountains, and the diamond-backed rattlesnake is sometimes seen in the swamps of the eastern section. Copper-heads and moccasins are occasionally met with. These are the only venomous reptiles in the State with the exception of the bead snake, which is sometimes found in the pine barrens. The red-bellied water snake, commonly called moccasin and regarded as deadly poisonous, though perfectly harmless, is common over the greater part of the State. The kingsnake feeds on many small creatures which are enemies to the farmer and the gardener.

The life of the waters is even more varied than that of the

land. Our coast is the meeting place of many creatures whose habitat is from Cape Cod to Hatteras and from Hatteras to the West Indies. The sounds and tide-water streams teem with bluefish, mackerel, shad, herring and menhaden. Currituck Sound, since the closing of Caffey inlet by the great storm of 1800, has become fresh, and contains only fresh water and anadromous fishes. Black bass and white perch are very abundant, and at the proper season rock and herring enter the sound in considerable numbers. In the fresh-water streams are perch, trout and numerous other fishes. The value of the annual catch of fish in North Carolina is about \$200,000.

Mineral Resources.—The mineral resources of North Carolina are rich and varied. One hundred and eighty-four species of minerals have been catalogued. Some are of great rarity, and one of them has recently yielded to science two new chemical elements. Some of the more valuable metals, as gold, iron and copper, with the associated ores of zinc, lead and silver are widely distributed.

Gold has been found in thirty counties in sufficient quantity to be worked with profit. The mines that have thus far been most productive lie in the upper part of the hill country. In the production of gold North Carolina is the first State east of the Mississippi river. A nugget of gold weighing about thirty-seven pounds Troy (twenty-eight pounds avoirdupois) was found in 'Cabarrus county in 1803. A nugget weighing thirteen and a half pounds was found in the same locality (Reed placer washings on Meadow Creek) in 1824, and since then have been found several small nuggets weighing from one to nine pounds, the total weight of the nuggets being one hundred and fifteen pounds avoirdupois. At the Crawford or Ingram mine, in Stanly county, a peculiarly rich auriferous gravel is found lying in a small basin with a depth of not over two feet. The gold occurs exclusively in nuggets, some of them weighing as much as ten pounds.

Silver is rare in North Carolina. It has been found at Silver Hill, in Davidson county, and also in Cabarrus, Ashe, Gaston and Burke counties, with traces of the metal in a few other localities. It is found in the gold mines in association with the gold. The value of the silver annually produced is about \$3,000.

Copper is found in small quantities in several mines, the best

known being those of Person, Jackson and Ashe counties. The Ore Knob Mine, in Ashe county, is one of the richest, and is extensively worked.

Iron is found in nearly all the counties of the State from tidewater to Tennessee. In the east are the limonite ores of low grade; in the middle section we find the hematites and black band ore; in the west are vast beds of pure magnetite. In 1892 North Carolina produced 25,379 tons of iron ore. Since then the statistics of iron production in North Carolina have been included with those for Georgia.

Coal of a quality little inferior to that of Pennsylvania is found in Chatham and Moore counties; and Stokes and Rockingham counties furnish very inferior coal, which has been used a little in the immediate neighborhood.

Many gems have been found, including the diamond, ruby, sapphire, emerald, beryl, lazulite, amethyst, garnet and agate. In the production of gems, as well as in variety of minerals, North Carolina stands at the head of all other States. A lithia emerald (hiddenite) has been found in small quantities at Stony Point, Alexander county. Stony Point and Cowee, N. C., and Paris, Me., are the only places in the United States where systematic mining is carried on for obtaining precious stones.

North Carolina produces many minerals, having special application to the useful arts. The most important of these are mica, corundum, asbestos, baryte, garnet, zircon, tale, graphite, monazite (containing a small percentage of thorium which is used in the manufacture of certain incandescent lights) and kaolin, or porcelain clay.

The mica industry is important and flourishing. Mines occur in Ashe, Mitchell, Yancey, McDowell, Cleveland, Alexander, Wikes, Catawba, Buncombe, Haywood, Macon and other counties. The Ray Mine, near Burnsville, and the Iotla and Burningtown mines, near Franklin, are the most noted. Of this mineral North Carolina furnishes the greater part of the world's supply.

This State also furnishes the greater part of the corundum used in the United States. A few miles north of Franklin, Macon county, on Cowee creek, hydraulic mining for gem corundum is conducted on a large scale.

Tin is found in Cleveland and Gaston counties.

Building stones, granite, sandstones, white and variegated marbles are found in the middle and western sections. The eastern section furnishes a good shell rock, or coquina, which is a fair building stone, and phosphate rock and marls useful for fertilizers.

The People.—The people are of English, Scotch, Scotch-Irish, German, Swiss, French or Dutch descent. Besides these there is a very large population of African descent, constituting little less than thirty-five per cent. of the total population; a remnant of the aboriginal inhabitants, the Cherokees, still in possession of a large territory in the western part of the State; and a small body of half-breeds, known as Croatans, occupying a portion of Robeson county, and claiming to be descendants of the lost colony of Roanoke. The homogeneity of the people, notwithstanding their diverse origins, is marked, and devotion to the State is characteristic of all North Carolinians. Country dwellers comprise nine-tenths of the people of North Carolina. The largest city in the State, Wilmington, has only about 23,000 inhabitants, and, with the exception of very few localities, these country-dwellers are increasing more rapidly than the urban population.

Agriculture.—Agriculture is the leading occupation. fourths of the population are engaged in farming. Cotton is the chief production of the eastern section. In the middle section cotton and tobacco are raised, but tobacco is the most profitable crop. In the mountains tobacco is the chief product. ties of the middle section which border on Virginia are in what is known as the Golden Tobacco Belt. In the southeastern portion of the State, as the pine trees have become exhausted, the owners have turned from turpentine industry to the raising of strawberries, lettuce, potatoes, cantaloupes and other "truck" for northern markets, and the truck farmer of to-day makes more clear money than the great land owner of a former generation ever made on his cotton and turpentine orchards. Rice is also an important product of the State, the annual crop selling for something more than **\$**200,000.

Horticulture.—Fruit growing is rapidly becoming an important industry in North Carolina. Pears attain perfection on

the coastal plain, and here is the home of the scuppernong grape. In the sandhills region of this plain, which has become a winter resort for persons afflicted with diseases of the throat and lungs, many northern people have made permanent settlements, and have turned their attention to the cultivation of fruits of various kinds, particularly the grape, peach and blackberry. In the hill country less attention has been paid to fruit growing than in either of the other sections, but the culture of apples, peaches and plums has proved profitable, and grapes for wine-making are grown to some extent. The mountain section is the home of the apple, and is probably destined to become the greatest apple-growing region in America when its possibilities are fully known to fruit growers. Many grapes not native to this section have been grown by grafting on the native roots, and wine from the mountain vineyards is gaining an enviable reputation.

Forests.—The forests of North Carolina have for many years been one of the chief sources of revenue to the people of the State. These forests in their original distribution covered almost the entire State. The exceptions are the important savannas in the eastern section covered with coarse grass and sedges, and isolated mountain summits in the extreme west, which extend above the tree line, but produce fine grasses. The early Pennsylvania German settlers in the upper Piedmont country found, one hundred and fifty years ago, in the region drained by the Catawba and its tributaries, an extensive prairie over which roamed the buffalo, or bison. The only trees, they state, were immediately upon the water courses, and in proof of this it may be pointed out that all the larger trees of the region are to-day found along the streams.

The forests of long-leaved pine are the most important. They grow in dry and sandy soils of the coastal plain, furnish large quantities of lumber, spars and naval stores. Naval stores are tar, pitch and turpentine manufactured from the resinous sap of the pine. The trees selected for "boxing" are usually twelve to eighteen inches in diameter, although sometimes smaller. A "box" is made in the trunk of the tree by a cut slanting downward, about seven inches in depth, and generally a foot above the ground, and met by a second cut started ten inches above the first and running down from the bark to meet it. In this way a trough is formed

four inches deep and four inches wide at the top. A "crop" consists of ten thousand such boxes. The boxes are cut early in November with a narrow-bladed axe made for the purpose. as the turpentine ceases to flow freely from the upper surface, the dried resin is taken off with a sharp, narrow, steel "scraper," and the surface "hacked" over so as to expose the fresh surface. After the first season, the boxes are hacked as often as once a week, and the exposed surface is thus extended upward sometimes as much as twelve feet above the ground. Then the scraper is fastened to a wooden handle. Once a month, or oftener, the resin caught in the bottom of the box is taken out with a small, sharp, oval, steel spade attached to a short, wooden handle, and put into a bucket. These "drippings," as they are called, are then put into barrels and carried to the distillery. What passes from the still in the form of vapor, and is condensed, is known as "spirits of turpentine;" that which remains behind, and becomes solid, we know as "rosin." Eighty thousand barrels of tar were manufactured during the census year, 1880, in North Carolina, and ten thousand barrels in the other Southern States.

The total value of the crop of naval stores during the last decade was about \$8,000,000 annually. Then North Carolina led the world in the production of naval stores. Now she is surpassed by Georgia, and closely followed by South Carolina, the trucking interests having supplanted all other industries in the pine barrens. In 1890 Georgia had \$2,242,592 invested in the tar and turpentine industry, North Carolina had \$785,055, and South Carolina \$605,873, while the value of the product in these States for that year was \$4,206,395 in Georgia, \$1,670,396 in North Carolina, and \$1,422,588 in South Carolina.

To the north of Neuse river loose loams are the more frequent upland soils, and the growth is loblolly pine (the North Carolina pine of commerce), with an undergrowth of small oaks. Even in the region of the long-leaved pine, this loblolly pine, known locally as rosemary and slash pine, is found near the streams and larger swamps. The white cedar or juniper is found on the peaty soils of this same section, and these lowlands are among the most valuable timber land of the State.

The hill country, or piedmont region, is characterized by forests

of 'hardwoods, particularly oaks, hickories and dogwood, mixed with the short-leaved pine. "There are occasional belts of hardwoods containing no pine, as the one which passes through Orange, Alamance, Granville and Person counties; the belt of magnificent oaks and hickories passing from Greensboro southwest to Charlotte, and similar belts in the western parts of Lincoln and Catawba counties. In a few places, as in the southern parts of Union county and in parts of Durham county, there is much more pine than oak in the forest, the post oak, black-jack and Spanish oaks of the original growth forming a lower story beneath the pines."

The forests of the western part of the State lie mainly upon the mountain slopes, the narrow valleys being largely under culti-The forests are made up largely of hardwoods, oaks, yellow poplars, or tulip trees, and chestnuts, all of which reach, on the lower mountain slopes, the largest size attained by such trees in the United States. With these, and particularly on the north slopes and at higher elevations, are lindens, birches, hard and soft maples, beech, ash and wild cherry. "On cold north slopes there are forests of hemlock, and on many of the mountains above an elevation of 4,000 feet compact forests of spruce and fir are found. On the lower hills of the river basins, and especially on those lying near the Blue Ridge, white pine is found which is now being utilized for shingles and building material, and more largely for box boards." No yellow pine occurs on the mountains, although south of the French Broad river it grows along the river hills, and is used to a considerable extent for lumber.

Manufacturing occupies a subordinate place in North Carolina, but the number of factories, and the amount of money invested are gradually increasing. They comprise cotton and woolen mills and tobacco, wagon and furniture factories. The existence, in most parts of the State, of abundant water power, together with the great variety of raw material, is rapidly making North Carolina the foremost manufacturing State of the South. The tobacco factories are chiefly in the middle and western sections. Besides these, the leading manufactures are naval stores, lumber, fertilizers, wooden ware, iron, paper, mill-stones, cotton-seed oil, boots and shoes.

Mining is carried on to some extent in the middle and western

sections of the State, the richest mines of gold being in the piedmont country.

Towns and Villages.—The earliest permanent settlements in the State were made in the region just north of Albemarle sound by immigrants from Virginia, attracted to this region by its "delightful climate, magnificent bottom lands, and bountiful products." The settlements spread along the streams and across divides to other water courses, "with ever the same object in view, more bottom land and better bottom land." In time, commerce with other colonies arose, and larger settlements grew where there was good harborage for the small vessels of that day. Among the oldest towns which owe their origin to this cause, were Bath, Edenton, Hertford, Nixonton, Newbern, Beauford (now Beaufort), Brunswick and Wilmington. As settlements advanced up the larger streams, such towns as Halifax, Tarrburg (now Tarboro), Dobb's Court House (now Kinston), and Cross Creek (now Fayetteville), came into existence near the heads of navigation in the several rivers. As the water courses were the highways, the settlements at the confluence of two streams gradually grew to greater importance; as, Newbern at the confluence of the Trent and Neuse, Waynesboro where Little river joins the Neuse, Wilmington where the North East Cape Fear and the Cape Fear come together, and Cross Creek, afterwards Fayetteville, where the stream which gave the town its name joined with the Cape The settlers in the hill country came up the streams from the east or else came into North Carolina from Virginia and Pennsylvania, establishing themselves on the fertile prairies where they could find pasturage for their cattle, or along the streams whose banks abounded in game and whose waters teemed with fish. Many of the settlements were made at good mill sites along the streams, but the larger towns grew up in the inter-stream region on the roads connecting the mill-site settlements. One of the most important of these mill-site towns was Lincolnton. railroads of the State followed the uplands and ridges, often missing the more important towns. In this way old Waynesboro on the river has been deserted, and Goldsboro on the ridge nearby, named for a railroad engineer, has grown to be the most important city of that section; Martinsburg, or Guildford Court House,

built originally on the old road leading from Virginia by Salisbury to Charlottesburg, in Mecklenburg county, was soon superseded by the village of Greensboro, now grown into a thriving town. Tally Ho, a colonial village on the old stage road from Oxford to Hillsboro, has been deserted for the modern railway station of Stem. While such instances as these are numerous, many of the older towns have maintained their positions and have grown to prosperity, their very life compelling the railways to go their way. Such a town is Charlotte, grown from a mill-site settlement to an important manufacturing town and railway centre, and doubtless destined to become the chief town of the State.

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NOTES.

Nicaragua.—The following notes are from an article in the September number of the Bulletin of the Bureau of American Republics.

Geographically and climatologically, Nicaragua is divided into two distinct zones by the chains of the Cordilleras Mountains, which, more or less broken and with numerous flanking spurs, traverse the republic in a northwest and southeast direction, parallel to the Pacific Coast.

On the eastern slope, we find a wild and unexplored country, covered with a dense and almost impassable virgin forest, inhabited only by a few scattered bands of wild Indians, except on the immediate coast of the Caribbean Sea, where are found the Mosquito Indians and Caribs, negroes from Jamaica and other West India islands, and a few "Kroomen," negroes from the west coast of Africa, brought originally to Panama to work on the canal. There are white settlements at Greytown and Bluefields. All the civilized part of the country lies on the western slope and in the northwestern part of the republic, where the Nicaraguans proper live, and where are to be found the large cities and cultivated farms and haciendas. This localization of population is accounted for by the climatic conditions. The writer resided for over two

years in this country, in charge of the surveys and preliminary work on the Nicaragua Canal, and had exceptional facilities for studying the country and its resources. From the meteorological records taken daily under my direction, we find that a rainfall of 297 inches per year occurs at Greytown, while on the west side, the mean precipitation is only sixty-five inches, and in the year 1883, only 47.44 inches was recorded at the National Institute, Granada. The seasons are well defined on the west side, but on the east side, there appears to be no regularity, but it rains nearly every day.

In the San Juan Valley, the trees grow to an immense size and height, and the ground between is covered with a thick undergrowth of vines and shrubs. The soil on the east side is mainly reddish clay overlaid by the leaf humus. On the west side, there is little of the clay and more of good black soil, in many places underlaid with lavas and volcanic ashes and gravels. The littoral cordon on the east coast is sand, while on the west coast it is almost universally rock, except in the re-entrant angles where sands have accumulated by the action of the waves or been brought down by streams.

The native industries are unique. They comprise the manufacture of fine hammocks and straw hats, nearly as fine as the Panama; jewelry and silver work made by the native goldsmiths; the making of coarse pottery, small images, and vases by the Indians; the carving of jicaras and cocoanuts, which is very artistically executed. Jicaras are the hard-shelled gourds, which grow very plentifully on jicaro trees on the west side and in the interior. They also make a great many roofing tiles by hand and crude appliances. The roofs in the cities are all covered with them, no shingles being used, except in Greytown and Bluefields, where the houses are built of wood.

All the large houses and stores, business blocks, etc., in the cities are built almost universally of mud walls, nearly if not quite three feet thick, and almost universally of only one-story in height-These buildings are very cool, and are built with large doors opening from the rooms directly on the street in front and into the "patio," or garden, in the inside. The rooms are all built around this "patio," and the whole often covers a half block. Adobe, or

sun-dried bricks, are also used. The outside and inside are stuccoed and the surface looks very well. No outside blinds are used on the houses.

The Nicaraguans also make a coarse brown sugar, very heavy, and molasses, but there are no refineries. Cattle raising is a thriving industry and thousands of fine cattle roam on the plains, or llanuras, in the northwestern provinces. Great quantities of cigars, or "puros," are made in the Republic, nearly all of which find a home market, and nearly every poor family in the towns count this as one of their always ready sources of income. raise a very good tobacco. The country people make all their own They make their own country houses sometimes with walls of adobe, but generally of bamboo canes very neatly interlaced, and covered with palm leaves. These houses they make very ingeniously, without the use of a single nail, the frame and the roof covering being securely lashed with bejuco vines, which grow in great abundance in the woods and are very strong and durable, some varieties being almost as strong as wire and are called bejuco de alambre, or wire vine. The raising and making of indigo was, many years ago, a flourishing business, but it now languishes. owing to the cheapness of aniline dyes, which have superceded it, The natives manufacture by hand a great deal of house furniture of native woods, which, when well made, is costly, a nice bedroom set made of mahogany, costing \$1,000 in Nicaraguan money.

They make also rubber goods, such as blankets or sheets, bags, ponchos, etc., by coating cotton cloth with the native rubber, which do very well for several years' use, but in the course of eight or ten years the rubber coating decays and cracks off. They make also large and small canoes and large "bungos," or sailboats, the canoe being neatly hollowed out of a single log.

There are fifty-four different kinds of good lumber trees growing in great abundance in the country, many of which produce the finest lumber in the world. There is untold wealth in the forests of Nicaragua. Not only are there the trees just mentioned, all of which furnish exceptionally good lumber and have been selected from 173 varieties, comprising all that I examined (and there are probably a great many others never yet described or found), but there are 40 trees furnishing industrial or medicinal gums, bal-

sams, resins, textile materials, oils, extracts, essences, food and drink and spices, besides 74 varieties of fruit trees, of which 17 are wild and 57 cultivated. It would be impossible to even enumerate all the varieties in this paper for want of space. Only one or two of them have English names. Of these, mahogany, cedar, pine and live oak are well known. I did not see any pencil cedar in the country. There is also the almendro, or ibo (wild almond), called in Jamaica Break Ax (Quebracho), and is probably the tree known in Argentina as Quebracho (negro), which grows to an immense size and may be likened to live oak, but is very much harder, stronger, harder to split and more durable. It is almost impossible to cut this tree down with an ax, and it is equally hard to drive a nail into it. We used to dispose of them in clearing the right of way for the Nicaragua Canal by digging under the roots and blowing them up with dynamite, and then cutting them up with cross-cut saws. It has an intertwining grain, and although so hard to work, is almost as strong and durable as iron. In Paraguay it is called the king of hard woods. It bears an almond, from which ibo oil is made, which is much esteemed in pharmacy and is stated in the report of the Ministro de Haciendo of Nicaragua to bring \$2.50 per bottle. The cortez, called in English the man wood or iron wood, is found in abundance, as is the ebony, called palo de piedra. The nispero, or itaiba, very large and strong, lasts indefinitely in the water, is said to be equal to mahogany for cabinet work, bears an excellent fruit, and might be compared with the red oak in appearance, but is infinitely stronger and more durable. Guyacan, two kinds, very strong, produces a medicinal gum; Guanacaste, an enormous tree, used for making boats and boards, furnishes a useful varnish; cattle eat the fruit. Then, there are the cottonwood, rosewood and granadillo, wild tamarind, of which the fruit is well known and the wood used for making wheels, boats, etc., hard and strong; the sapodillo, a very hard wood to work and said to be indestructible by sea worms; very durable. A door lintel of this wood was found in the ruins of the ancient city Palenque in perfect state of preservation, where it must have remained over three hundred years.* Of the dyewoods, there are the Champeche, or logwood,

^{*}Stevens' Travels in Central America, Chiapas and Yucatan.

Brazil wood, the fustic, the mulberry, the dragon's blood and many others.

Of the trees furnishing industrial and medicinal gums there are the rubber tree; the gutta-percha; the pala de ceibo, or vegetable wax tree; the annotto, used for coloring butter and cheese; copaiba, balsam of Peru, liquid amber and a species of gum arabic, cinchona, copal, rosin and turpentine, coyol palm oil, coco oil, castor oil, sesame oil, cacao oil made from the fruit of the plant; corozo palm oil, made from the very abundant nuts of the corozo palm, which make an excellent soap; sandalwood oil, and other oils, gums and resins too numerous to mention. A tree which cannot be classed with any of the others is the milk or cow tree, which grows wild and produces, when cut, a milk, which the eminent traveler Humboldt used in his coffee. It is very common on the line of the canal. It contains a great deal of wax, and should be boiled to coagulate the wax before drinking.

The vanilla bean grows wild on long vines in the woods. Also a cinnamon tree, of which the bark is used. The nutmeg is cultivated successfully in British Honduras, where it was introduced from Jamaica; also the pimento or allspice. Pepper grows wild. This country is eminently adapted to the raising of spices, and there is no doubt but that all those raised in the East Indies can be raised here. Of the fruit trees, the orange, lemon and all others of the citrus family flourish, especially on the west side and On the west side as fine fruit is produced as the best in interior. The cacao is one of the principal sources of wealth of Florida. the country, and the prepared cacao always brings a high price. The cocoanut grows on the sandy coast in abundance. fruit grows everywhere, and the fruit is very good and nutritious, boiled or baked. It requires a little over four years from the slip before bearing, and yields two crops a year. They weigh up to thirteen pounds. Mangoes, pawpaws, aguacates or alligator pears, sapodillos, and an almost endless variety of tropical fruits flourish. Coffee is the principal crop of the country, and is grown on the highlands of the north and northwest. According to the Official Gazette of the Government, twenty mananzas, or 37.40 acres, will sustain 20,000 trees of coffee. Clearing, grubbing and preparation of the land; planting this number of trees and bringing them

into full bearing, which will take three years, will cost \$3,423 in Nicaraguan money. This includes the cost of two mules, tools and agricultural implements, a temporary cabin, an overseer and the interest on the money for three years, and allows \$300 for unforeseen losses, but nothing for land, as the Government will give a new settler 95 acres of land for a homestead. The same paper estimates the cost of running a coffee plantation after it is once formed, including picking the crop, hoeing and keeping the ground clear of weeds, etc., at \$1,532.70, Nicaraguan money, per year, and supposes the yield of coffee to be two pounds per tree.

Bananas are largely raised in the Mosquito Territory and shipped from Bluefields to New Orleans. This industry is more or less remunerative; the crop is ready to gather in eight months after planting. Corn yields well, and two crops are easily produced from one piece of land, and three crops may be produced. Sugar cane grows rapidly and well. Beans grow luxuriantly, and are one of the principal articles of food, called "frijoles." All kinds of melons do well. Pineapples grow finely in all parts of the country. All kinds of garden truck also.

Agricultural laborers are paid from \$12 to \$14 per month, in Nicaraguan money, and board; and female house servants \$2.50 to \$5 per month.

R. E. D.

Arizona.—Dr. B. E. Fernow, Chief of the Division of Forestry, United States Department of Agriculture, writes as follows regarding the high plateaus of Arizona near the San Francisco Mountains:

"Here, as in the southern portion of Arizona, there are two wet seasons, winter and summer. On the plateau, after the beautiful days of Indian summer in November, winter begins with Christmas. While mostly clear and calm, with temperatures rarely below 22 degrees at night, ranging to 50 degrees or 60 degrees in the day, snows come every ten to fourteen days to a depth of 4 to 24 inches, drifting badly, but rarely lying long, except on the higher levels, and even the frozen ground becomes soft in the middle of the day. Spring begins about the middle of April and is the dry season—windy, dusty, the first half cooler, the last half warmer, than one would wish. With the first week of July the

rainy season sets in, lasting until September. With it comes the profusion of flowers which is characteristic of the Rocky Mountains, and which by and by will fill the pine woods below with gay beauty and luxuriance. Whole fields of the blue flag (Iris versicolor) bloom; there are magnificent carmine Gilias and Pentstemons, the dark purple and golden Primula Parryi, the yellow columbine, and a host of others changing off through the season and making this plateau a veritable flower garden.

"Presently we start southward, looking back on the hospitable town of Flagstaff and its grand mountain and forest entourage, across the waste which the logger and the unavoidable forest fire have made, and the natural prairie or glade south of it. glades, from a few acres to several miles in extent, are a very general and interesting phenomenon throughout these woods, furnishing not only most pleasing vistas, but opportunity for pasturage and agricultural use. Their soil is usually rich black loam washed from the surrounding hills, rather compact and liable to a wide range of moisture conditions on account of deficient drainage, and hence inimical to tree growth, but readily supporting a greensward of grass. In wet seasons these depressions sometimes turn into lakes. Mormon lake, which we pass, is such a prairie, some five miles long and one to two miles wide, which, when the Mormons arrived there, had the appearance of a rich meadow, inducing them to settle and go into dairy farming; after a few years the glade filled up with water and became a lake; in 1895 it was all dry except a small remnant of water in the lowest depression. As these patches of fertile land, forming about 15 to 20 per cent. of the forested area, are destined to become objects of agricultural development (they have begun to be so used) and in that way to be helpful in the rational management of the surrounding forest country, it would be of interest to experiment as to their best treatment; many of them by judicious ditching, by which the moisture extremes may be abated, can undoubtedly be made to produce various crops besides the potato and alfalfa or oats which the short season and the cold condition of the soil now permit."-Nat. Geog. Mag., July-August, 1897.

The Gold Coast, Ashanti and Kumassi.—In the January number of the National Geographic Magazine is an excellently

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illustrated description of the Guinea coast and vicinity, from which the following notes are taken.

"The Slave coast extends from the Niger some 200 miles west to the Gold coast, the latter section of the Guinea coast lying between the old Ivory and Slave coasts. A hundred years ago these distinctive names were applied by all geographers, but to-day only the Gold coast is to be found on our maps. Three hundred and fifty miles of the latter coast belong to Great Britain, while the interior border of the colony, of which this sea-coast forms one boundary, stretch away toward the north as far as the Ashanti country. Since the recent taking of Kumassi and the downfall of the Ashanti confederation the hinterland of the colony has been extended 100 miles further to the north.

"The principal port is Cape Coast Castle from which palm-oil, palm-kernels, ginger, gold dust, mahogany, monkey skins, camwood, and rubber are exported in enormous quantities to England and the European continent in exchange for rum, gin, trinkets, and other articles of European manufacture.

"The shore is difficult of access, as is the case along the entire Guinea coast; sand-bars block the mouths of the rivers and harbors are lacking, consequently passengers and cargo are discharged in boats through a heavy surf on a frequently dangerous beach, and many a human life and many a ton of valuable merchandise has been lost in the effort to effect a landing. These surf-boats are English built, of heavy timber, twenty-eight feet long, six feet beam and have long, overlapping bow and stern in order that they may surmount and not cut the breakers. A boat's crew is made up of eleven men and a coxswain. The latter steers with an ordinary long-bladed, straight oar or sweep, while the crew sit on the gunwales of the boat and propel it with paddles, the blades of which are fashioned not unlike a trident. The crew are almost naked, a loin cloth being the only attempt at clothing. lustily while paddling, bestowing fulsome praise on the particular individual who has engaged them, and chanting vigorously of the amount of "dash," equivalent to the "bakshish" of the East, which he will probably shower upon them when they have landed him in safety.

"The stranger visiting the Gold coast will at first be sorely puzzled by the similarity of the names of the natives. Every child 316 NOTES.

takes its surname from the week-day of its birth, and strangers theirs from the day of their arrival, with an additional sobriquet description of some personal peculiarity. For instance, a child born on Wednesday receives the name of that day of the week, Kwako. Kwabina (Tuesday) and Kwako are held to be "strong days" of birth; but the children that appear on Fridays, Saturdays and Mondays are considered as "weak as water." will induce the Fanti to sleep with his head toward the sea or to take possession of a new dwelling-house on a Tuesday or Friday, both these days being regarded as unlucky for this purpose. Paternal affection and filial love apparently do not exist. The mother nurses her child for one or two years, a 1 then it must shift for itself. There is no appearance of affec n even between husbands and wives, or between parents and children; and Duncan, an English traveler who visited the Gold coast fifty years ago, states tha many parents offered to sell him their sons or daughters as slaves.

"As the shore is difficult of access from the sea, so Kumassi and the interior are difficult of access from the coast. The country lies in the forest belt of the continent, and the white man travels with difficulty. The native can wend his way along the narrow path, sleeping wherever nightfall may find him, and eating from his own supply of kenke, fuful, or plantain. But the white man must provide himself with hammock men, if he would spare himself, and carriers to transport his food supplies and paraphernalia; in fact, the necessary preparation for a trip of a few hundred miles through the average African hinterland are quite as extensive as for a trip around the world by the regular routes of travel.

"Kumassi is about three miles in circumference, oval in shape, and is surrounded by a noisome swamp. The main street runs north and south and is about a mile in length. It is less than thirty yards in width, and on either side are built the swish and thatch huts. Back of these two rows of huts are perhaps three thousand other huts. Allowing six or seven inhabitants to each hut, the population may number, but can hardly exceed, 20,000. There seemed no regularity of direction or plan in the streets or passageways between the huts, and without a guide it

would be difficult to find a certain place. In the extreme south-eastern part of Kumassi, adjacent to the swamp, is the king's palace. It consists of a hundred huts grouped within a stockade thirty feet high. This stockade gives way in places to the walls of two and even three-storied huts, evidently erected under the direction of European captives. The decorations on the walls of the palace, both interior and exterior, are crudely worked in clay in faint bas-relief, and consist of grotesque figures of men and women, hybrids, with bodies of sheep, goats, elephants, snakes, deer and leopards combined with heads and tails of monkeys, lizards and alligators. On one hut I noticed the figure of a man holding in one hand a human head, evidently his own, as that member was missing from its proper place.

R. E. D.

Temperature Beneath the Earth's Surface.—The question of the internal heat of the earth has always been a very interesting one to teachers and students of geography, especially to those more or less skeptical regarding the old dictum "that the centre of the earth is in a state of igneous fusion." One of the bes means of getting records of earth temperatures is by means of deep borings made usually for economic purposes. The deepest well in the world is at "Paruschowitz, near Rybnik, in eastern Silesia. More than two years ago it was over 6,500 feet deep, and it was the intention to go about 8,899 feet." The second deepest well is at Schladebach, near Leipzig, which is 5,740 feet deep, and shows a bottom temperature of 135.5°F. the surface temperature being 51.3°F. The third deepest well in the world is at West Elizabeth, Pa., where in February last the depth was 5,386 feet. temperature at depth of 5,000 feet was 120.9°F.— Wm. Hallock, in School of Mines Quarterly, January, 1897.

The Spelling of Geographic Names.—At the regular monthly meeting of the U.S. Board on Geographic Names, held a few days ago, decisions were made as to the spelling of 149 geographic names. This Board, it will be remembered, is composed of ten members, representing those bureaus and departments of the government which are more or less concerned with geographic publications. It was created by executive order September 4,

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1890, to the end that uniform usage in regard to geographic nomenclature and orthography shall obtain throughout the executive departments of the government and particularly upon its maps and charts.

Among the decisions rendered were a few of general interest. These relate to names brought into prominent notice through the Klondike gold excitement.

As to Klondike, the decision is to spell it as here given, and not Clondyke, Klondyke, Chandike, Chandik or Deer, Reindeer, Trondike, nor Thron Diuck.

One of the lakes of the upper Yukon was named Lebarge by the Western Union Telegraph Expedition in 1868, after Mike Lebarge, a member of the exploring party, and a popular member, it may be added, who is now living somewhere near Ottawa, Canada. Late publications have fallen into the error of writing this Labarge, but the Board adheres to the original form, Lebarge. There is a Lebarge river in Alaska.

When Schwatka discovered the Yukon, in 1883, he named one of the lakes on its headwaters *Lindeman*, after Dr. Moritz Lindeman, now Vice-President of the Bremen Geographical Society. This sometimes appears, erroneously, as Lindemann and Linderman. The Board adopts Lindeman.

One of the principal tributaries of the upper Yukon is the Lewes river, named by Mr. Robert Campbell, of the Hudson Bay Campany, about 1848. This is often miscalled Lewis.

The inlet, river and village at the head of Lynn canal, which now appears in the newspapers, almost daily, under the form Dyea, is an Indian word, which has appeared in many forms. Admiral Meade, in 1869, wrote it Tyya; Krause, in 1882, wrote it Dejäh; Schwatka, in 1883, Dayay; Dall, in 1883, Taiya. The Board adopts the form Taiya.

For the lake and river variously called Hootalinqua, Hotalinga, Teslin-hina, Teslin-too or Teslin the Board adopts *Teslin*. The terminations 'hina' and 'too' are said to mean river in different Indian dialects.

An Indian village on the middle Yukon is called *Nuklukayet*. This has been written in several forms, including the erroneous one, Tuklukyet.—*Science*, Oct. 15, 1897.

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Geography Club.—The Editors of the JOURNAL take pleasure in calling attention to the Teachers' Geography Club, which has recently been formed in Massachusetts, as an outgrowth of the work in Physiography at the Harvard Summer School for 1897.

It is believed that coöperation will bring about an improvement in the methods of teaching geography more quickly than individual effort, however earnest; and it is hoped that, through the combined efforts of members of this Club, apparatus and material may be brought within the reach of the teachers of geography.

The officers of this Club are as follows: President, Mr. W. H. Snyder; Vice-President, Miss L. C. Patterson; Treasurer, Mr. W. L. Phinney; Recording Secretary, Miss M. E. Thompson; Corresponding Secretary, Miss M. C. Mellyn. It is hoped that Geography Clubs, or teachers of geography in various sections of this country, will keep in touch with this Club in Massachusetts, through a corresponding membership. Further information regarding corresponding membership may be obtained from Mary C. Mellyn, Normal School, Boston, Mass.

A Torrent-wash in Switzerland.—One of the frequent torrent washes of the Alps occurred last May on the south slope of the Rothhorn ridge, near the east end of Lake Brienz, where the Lammbach (bach stream or torrent) issues from a steep ravine. The previous torrential action of the stream had built an extensive alluvial fan (an accumulation of detritus with its apex in the ravine and a long fan-like slope descending toward the lake). The length of the recent stony wash from its source to the lake is $3\frac{1}{2}$ kilometres; its breadth, where widest near the lake, 120 meters; its thickness at the same place, $2\frac{1}{2}$ to 3 meters, increasing up stream to 4 meters. The advance of the stony flood was sometimes so slow that the grass in front of it was saved by mowing. The rifts in the slopes at the head of the ravine show that similar disasters may be expected for years to come. (Mittheilungen of the Natural History Society of Bern, 1896.)

Although unknown in countries of moderate differences in altitude between highland and lowland relief, torrential washes are of relatively common occurrence in mountainous regions, and, with ice falls and landslips, must be considered as characteristic dangers to the people in the valleys. The frequency and volume of torrent washes are increased by the reckless stripping of forests from the mountain slopes.—W. M. D.

REVIEW.

The Model of the Earth. By THOMAS JONES. The A. H. Andrews Company, Chicago.

The Jones Model of the Earth is a concentrated mass of geographical facts, arranged in so small a compass and after such a manner, that the ordinary teacher of geography has great difficulty in getting from it materials for the use of elementary Modeled on a scale that has the vertical element forty times the horizontal, it is evident that no conception of delicate earth shapes can be given. Distance and position can be told to a nicety, so careful is the workmanship, but the causal study of the physical features of a land surface is out of the question. The irregularities of the ocean bottoms, where divergences from a plain surface are slight, are fairly well shown, and are the best features of the model. The price of the model is no more than is right, considering the work of preparation, but yet is so great as to place the model beyond the reach of the average school. Surely most schools could get more usable materials with the same money by buying maps or models of a small area made to a rational scale. The student of locational geography will find much in the model that will help him in his studies, and it should be found in every museum or library. The maker has a right to be proud of his careful work on the scale adopted, which was the only possible scale, but he has not produced a result that can be of general use.

R. E. D.

The

Journal of School Geography

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

EDITOR:

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VOLUME II.—1898.

Lancaster, Pa. 1898.

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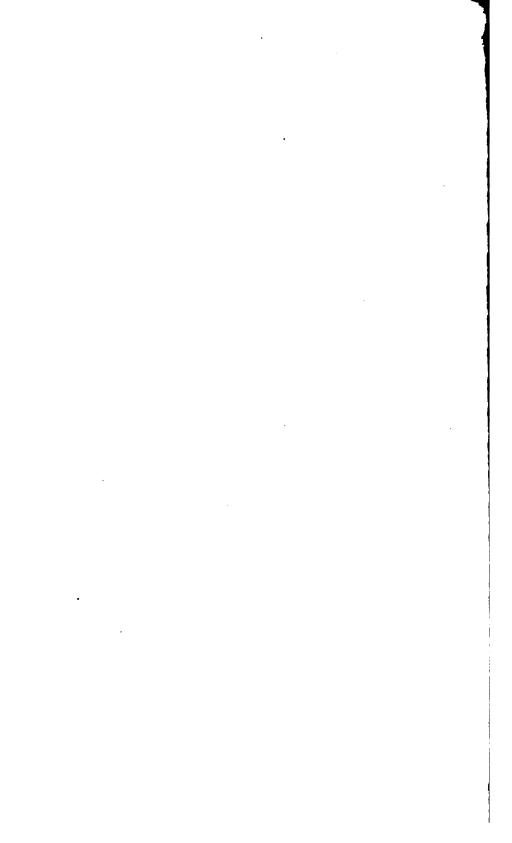
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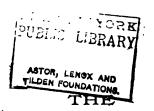
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JOURNAL OF SCHOOL GEOGRAPHY

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

TERMS OF SUBSCRIPTION.

One dollar a year in advance. Single copies 15 cents. Subscriptions should be sent to the Journal of School Geography, 41 North Queen Street. Lancaster, Pa.

Mss. intended for publication, books, etc., intended for review, and all correspondence. except concerning subscriptions, should be sent to the reponsible editor, Richard E. Dodge, Teachers College, 120th Street West, New York City.

INTRODUCTORY TO VOLUME II.

The JOURNAL OF SCHOOL GEOGRAPHY begins its second year of existence with the present number, and the Editors take this opportunity of summarizing briefly the results of the year just past, and of noting certain prospects for the future.

It is very gratifying to state that the JOURNAL has prospered educationally and financially far beyond the expectations of those few supporters who started it. The words of comment from all parts of the world have been most favorable and indeed flattering, and the assistance of every kind that has been volunteered so abundantly, has made the tasks of the EDITOR far easier than anticipated. With the new year several innovations are introduced, which are but the forerunners of others. Every effort will be made to give our readers as much of the best as the price of subscription will allow. Each issue will hereafter contain forty pages of reading matter, including such illustrations as seem most helpful. The illustrations chosen for publication will be mostly those capable of reproduction for class use. Especial attention will be given, as has already been announced, to Mathematical and Commercial Geography, and to Elementary Meteorology.

The staff of Editors has been strengthened by the addition of

Mr. A. J. Herbertson, of Colinton, Midlothian, Scotland, who will furnish notes, articles, etc., in regard to Great Britain and her dependencies, and who will act as foreign agent for the JOURNAL at the suggestion of the GEOGRAPHICAL ASSOCIATION OF GREAT BRITAIN, which has promised us active cooperation in every way. We welcome our new colleague most heartily and feel a bit of pride that our efforts of the year have won such commendation from abroad.

Again, we ask for the cooperation of all interested in the advance of geography teaching. Let us help one another. The EDITOR will be glad for all suggestions as to improvement that his readers can offer him, and in return will offer such assistance as is in his power.

SOME SUGGESTIONS FOR TEACHING ELEMENTARY METEOROLOGY.

I.

The great amount of attention at present being directed toward the science work in the elementary and secondary schools, promises important changes for the near future. Not the least of these in my judgment, will be that which shall furnish to elementary school pupils instruction in science better suited to their needs. Zealous teachers, under the spur of the many articles floating about in current educational literature, are frequently undertaking much more than can be successfully completed during the school year, or are wasting their efforts in attempting to teach too much abstract science. It is not an uncommon thing to find a child of the second primary year put at the task of constructing, "inductively," and through his "power of scientific imagination" (?), such a complex conception as that of the solar system with its motions, out of the insignificant, unsuggestive, and totally inadequate illustration of an orange moved about a feebly flickering stump of wax candle.

The remedy for such mistaken work, as also the relief, to a great extent at least, from congested science plans, will naturally come when the more abstract sciences are discarded until their proper time, and when, in the elementary schools, more stress is placed upon the concrete. The observational sciences should properly precede the experimental in any plan of instruction. The child mind has little power to deal with abstract ideas.

Such an arrangement of work will furnish plenty of science for the younger pupils. It will be science, too, of such a sort as to afford an ample amount of cultural and training value. Nature provides material for innumerable lessons upon those things immediately connected with the pupil's own daily life. A study of plants and animals is most valuable, not only in itself, but also in the aid which it lends to the teaching of such subjects as language, history, geography and even arithmetic. Still a third field for lessons upon nature—that of atmospheric phenomena or the science of meteorology—is, as yet, almost totally undeveloped.

This is unfortunate, considering the value of meteorology as a school subject. It must be borne in mind that meteorology has made rapid progress during the past few years and that it has become a well established branch of science. As a means of developing the powers of observation, thought, expression and judgment, it is scarcely excelled by any other scientific study. Once admitted to the school curriculum, meteorology may be trusted to make its way solely upon its own merits. The purpose of the present series of articles, therefore, is to urge upon teachers the advisability of attempting some systematic study of atmospheric phenomena with elementary school classes, and to offer some suggestions regarding the specific character which such study may profitably assume.

Three natural divisions of the study may be made, roughly corresponding to the customary grouping of the grades. These are characterizable as simple observational exercises, the reading of the simpler weather instruments, and the interpretation of weather conditions by means of local observations and the study of synoptic charts.

The first mentioned—simple observational exercises—properly comprises the work to be done in the primary grades, in the very earliest days of the child's school life. It will call the pupil's attention to the atmospheric conditions about him, together with the conditions dependent upon them, and will cultivate the power of intelligent observation. Such phenomena as rain, snow, the end-

less sequence of pleasant and stormy, of warm and cold, or of freezing and thawing days, all will furnish material for valuable lessons. And what better introduction to a universe controlled by immutable laws of cause and effect can be given the child, than to lead him to see the relation of such phenomena to the brooks, now nearly dry, now swollen by recent rains, to the condition of the soil, to the seasonal changes in vegetable and animal life, and, finally, to the life and occupation of man himself?

A little later when the mathematical bump is somewhat developed—say in the early grammar grades—the reading of the simpler weather instruments may be begun. Readings of temperature, rainfall, and wind direction, only, should be attempted at first. These should be combined with non-instrumental records of clouds, frosts, etc., and should be made as complete and accurate as possible. Emphasis should be put upon regularity in all this work and the feeling of personal responsibility should be aroused. When the taking of the readings is allowed to descend to a careless, automatic act, a great part of their value is lost. The enthusiastic teacher will find it easy to make them the means of arousing and developing a true scientific spirit.

Careful records of the daily readings should, of course, be kept. The plan to be followed in doing this can best be arranged, by each teacher, in accordance with the particular conditions existing for the class. A simpler arrangement of the record suggested later for the older classes may be found satisfactory. In any case, the continuous record should be accessible to each pupil, and from this, frequent generalizations should be made to bring out such important facts as the average time of daily maximum temperatures, daily temperature range, the clouds most common to various periods in the day, etc.

A mere outline of the work, only, has been attempted in the preceding. For more detailed directions as to equipment and mode of procedure with primary and lower grammar school classes, teachers are referred to a previous paper by Mr. Robert De C. Ward, of Harvard University.*

^{*&}quot;Meteorological Observations in Schools," JOURNAL OF SCHOOL GEOGRAPHY, February, 1897. A similar article, by the same author, was issued in pamphlet form as "Connecticut School Document No. 10, 1896." A limited

In the more advanced grammar grades, with which these articles are chiefly concerned, the work may be made more intensive and of such a character as to call for a considerable amount of logical thought on the part of the pupil. It has been the writer's experience that the best results are obtained when the observations of local weather conditions are combined with a study of weather maps. The maps show the atmospheric conditions existing simultaneously over a large area, and they furnish opportunity, therefore, for accurate generalizations, embodying practically all of the essential principles of elementary meteorology. Nothing is more to be condemned than the slipshod, inaccurate way in which these valuable charts are treated in many class rooms.

The instrumental readings should be more comprehensive than those undertaken earlier, and should include, in addition to those already mentioned, determinations of atmospheric pressure, and, if possible, also, of daily maximum and minimum temperatures, relative humidity and wind velocity. This involves the purchasing of considerable apparatus; but if the means with which to do this are not immediately available, an excellent beginning can be made with less. Then, perhaps, as the work grows, opportunity will arise for increasing the original equipment.*

Determination of atmospheric pressure are particularly important, and a good barometer should be purchased if possible. Very good results may be secured, however, with a simple siphon barometer such as may be made in a few hours by any teacher who has had experience in laboratory manipulation. I am now using one, constructed at a cost of \$1.00, which reads within half a millimeter of the Green instrument hanging beside it. The necessary materials are a piece of heavy glass tubing about one-fourth of an inch in bore and four feet long, a meter stick, and a small quantity of mercury. (If preferred, a siphon barometer tube all ready for filling may be purchased from any dealer in physical apparatus.) Bend the tubing into the form of a U tube with unequal arms, the longer about thirty-six inches in length, the shorter about

number of these pamphlets may be secured from Mr. Charles D. Hine, Secretary Connecticut State Board of Education, Hartford, Conn. The writer also has a few extra copies which he will gladly furnish on application.

^{*}Meteorological instruments of all kinds may be secured from H. J. Green, 1191 Bedford Avenue, Brooklyn, N. Y.

six, taking care to have the arms just far enough apart so that the meter stick may be fastened between them. Then close the long arm air-tight in a gas or alcohol flame, and fill the whole, to within a couple of inches of the top of the short arm, with mercury which has been thoroughly boiled to expel all air. Fasten the tube thus filled, closed end uppermost, to a strip of board about forty by four inches, and nail the meter stick firmly between the two arms, and your improvised barometer is complete. It may be hung in any convenient place, care being taken to have it perfectly vertical.

The only difficulties in construction will be encountered on attempting to fill the tube with mercury. These may be successfully overcome by holding the siphon tube with its closed end lowest, and pouring the mercury through a long vertical tube attached to the short arm by means of a piece of rubber gas hose. The weight of the column of mercury in the vertical tube wil force the mercury part way into the barometer tube, compressing the air within. By gently tapping the side of the long arm, the mercury may now be made to separate into small drops which, running down into the closed end, force out the air. A second method, very successful in case the siphon tube is of large bore, is to pour the mercury through a small, flexible tube, inserted inside the short arm and extending around the bend.

The siphon barometer is read by finding the difference between the heights at which the mercury stands in the two arms. This difference is, of course, a measure of the atmospheric pressure on the surface of the mercury in the short arm. It must be reduced to inches in order to be comparable with the records of atmospheric pressure given by the Weather Bureau. In taking the reading, the edge of a card should be placed horizontally across from the upper surface of the meniscus of mercury in the tube to the meter stick.

Directions for using the instruments employed in obtaining maximum and minimum temperatures, relative humidity, and wind velocity, as well as a description of the methods to be followed in many other operations connected with the study of the weather, will be found in a pamphlet entitled, "Instructions for Voluntary Weather Observers," which may be obtained by applying to the Chief of the United States Weather Bureau, Washington, D.C.

A copy of this should be placed where each pupil may have access to it.

In keeping a record of the local weather observations, any plan may be followed which is accurate and easily operated. A corner of the blackboard, reserved for that particular purpose, will be found convenient for making a temporary record of each day's readings. There is an advantage, however, in having the permanent, monthly record kept by each pupil individually. For this, cards about eight by ten inches in size, and either printed or carefully ruled and headed by each pupil, will be found very satisfactory. The headings, of course, depend upon the particular readings being taken, but the following is suggested as a convenient arrangement for a complete record:

METEOROLOGICAL RECORD.

Month of

. 189 .

Name:

Date.	Temperature.				Air pres sure in inches			Precipitation.				н	Humid- ity		Clouds.			1	
	Maxtmum.	Minimum.	: !	Mean.	Range.	A. M.	· >	- 1	Began.	En ded.	Amount.	Snowfall.	Dew Point.		Rel. Humi'y.	A. M.	P. M.	Prevail'g Wind di- rection and Ve- locity.	Charact'r of the day.
1 2 3							: ::	••	•••	١	• • •		.		•••				
Etc.	····	:	•	•••	: ::		: :	•	••••		• • • •				• • • •				

Space should be provided for each day of the month, and room left at the bottom of the card for a monthly summary. This should contain the following items, computed from the record of the month; maximum, minimum and mean temperatures for the month, temperature range during the month, total precipitation for the month, greatest precipitation in twenty-four consecutive hours, total snowfall, number of clear, cloudy and stormy days, prevailing wind direction for the month, dates of frost, sleet, etc., and any notable atmospheric phenomena occurring during the month, not otherwise provided for.

As soon as the instrumental readings are well under way and the pupils are familiar with the manner of record keeping and with the method of using the instruments newly introduced, the study of the weather maps may also begin. For this, an abundant supply of material will be needed, and the teacher should see to it that plenty of old weather maps are available, and that a copy of the current daily map is being received. Be sure to get the large lithographic maps, as the smaller, local ones are not complete enough. These may be obtained for use in schools, free of charge, by addressing the Chief of the Weather Bureau, Washington, D. C. If no old maps have been accumulated, a supply may often be obtained from the same source. In addition, a supply of blank maps, also obtainable from the Weather Bureau (Form D, \$1.67 per 1,000), a ruler of some sort, and several sheets of tracing paper will be needed.

Do not place the complete map in the hands of the pupils at first, but take up one element at a time. Temperature distribution forms a natural starting point. Select a map showing as regular temperature changes as possible, and read off the temperatures of the air at the various stations, as given in the appended table of the map, requiring each pupil to insert the readings on a blank map, near the proper stations. It is better not to give all the temperature readings at first, but to select only one or two stations for each State, so as not to make the conditions too complicated. Verbal statements of the distribution should next be attempted. Where is it coldest? Where warmest? Where (if low temperatures are shown) below freezing? What parts of the United States have the same temperature as the pupils' own locality?

A line may now be drawn separating all places having a higher temperature than 60° F. from those having a lower temperature. This is an isothermal line or isotherm, as it is commonly called. Others should be drawn for every ten degrees' change in temperature until the whole map is divided up into areas in which the variation in temperature is less than ten degrees. Examination should be made to see whether these lines follow the parallels of latitude. If not, the pupils should ascertain in what way they depart from the parallels.

The distribution of temperatures will be rendered still more obvious if, by means of colored pencils or crayons, the various temperatures be represented on the chart by different colors; as, for

example, all below 30° F. by blue, all between thirty and sixty degrees by red, all above sixty by yellow. The position of one or two isotherms for the following day may also be indicated, and thus the eastward progression of temperatures may be shown.

(To be continued.)

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SOUTH CAROLINA.

South Carolina has the shape of a somewhat irregular triangle, whose base extends 200 miles along the Southern Atlantic coast, and whose blunted apex rests upon the summit of the Blue Ridge, 300 miles to the northwest. The sides of the triangle are closed in by North Carolina on the one hand, and Georgia on the other. Estimates of the area vary somewhat. It is about 30,570 square miles, or nearly four times the size of Massachusetts. It has the same latitude as Morocco, Algiers or Japan, and the same longitude as the most western part of South America.

By its early charters the State once extended across the continent to the "South Sea." Changes in its boundaries were made at various times during the colonial period. It was reduced to its present size in 1787, after ceding to the United States a strip of territory 12 to 15 miles wide, and extending westward along the North Carolina line to the Mississippi. The boundary on the Georgia line is as follows: "The Savannah River, from its entrance into the ocean to the confluence of the Tugaloo and Keowa Rivers; thence by the Tugaloo River to the confluence of the Tugaloo and Chatooga rivers: thence by the Chatooga River to the North Carolina line in the thirty-fifth degree of north latitude, the line being low-water mark at the southern shore of the most northern stream of said rivers, where the middle of the rivers is broken by islands, and middle thread of the stream where the rivers flow in one stream or volume." It was intended that the boundary on the North Carolina side should run northwest from Goat Island, on the coast, to the parallel of 35°, and thence west along that parallel, but in locating it, deviations were made that

resulted in a gain of between 500 and 1,000 square miles. The course from Goat Island is N. 47° 30' W., and "instead of pursuing the parallel of 35° it turns west about 10 miles south of that line, and then on approaching the Catawba River, turns northward, pursuing a zigzag line to the forks of the Catawba River, which is about 12 miles north of that parallel; and from this point to the mountains the boundary line (of 1772) runs not west but N. 88° W., bringing its western end about 17 miles too far north." Thence it follows the mountain crests 50 miles, and then pursues a straight course to the Georgia line.

The State stretches across two great topographic belts, the coastal plain and the piedmont plateau. By these it is naturally divided into two sections which almost coincide with the local terms "upcountry" and "low-country." These sections are separated from each other by an old shore line that crosses the middle of the State from southwest to northeast, parallel to the present shore. This line forms the inner edge of the sand hill belt and passes from Augusta, Ga., through Columbia and near Camden and Cheraw. The average elevation of this dividing line is about 500 feet. From it the coastal plain slopes southeastward to the ocean and the Piedmont plateau rises gently northwestward to the Appalachians. The Appalachian region does not extend into the State. It, however, forms a portion of the northwestern boundary, and numerous spurs extend outward from it upon the piedmont plateau in Pickens, Oconee and Greenville counties.

The piedmont plateau embraces a third of the area of the State. Over most of the region its surface is gently rolling, but along the main streams it becomes hilly and much broken. The rocks of the region have been exposed to decay for a long time—even geologically speaking. They have become deeply decomposed, and the surface is covered with a thick mantle of disintegrated material still in place. From its long weathering much of it is in the shape of a fine, tenaceous red clay, which gives to the surface its deep color and renders the streams a tawny yellow. Viewed broadly, this gently rolling surface forms a plane to which the surface of the region was once reduced by erosion. The plane fails in being perfect in two respects. Beneath its general surface there are a multitude of valleys, large and small, in which the streams of

the region flow, while above it there arise, in certain parts, scattering peaks, chains and spurs. If, in imagination, the stream valleys were filled level with the hill tops, the old plane would be restored. From its outer edge the general surface rises gently to the northwest at the rate of about four feet per mile, and attains on its inner edge an average elevation of about 1,000 feet.

There are a number of small, isolated peaks in the middle and outer part of the plateau, such as Ruff's, Parson's, Gelky's, Anderson's and Henry's, and a broken chain on the northern boundry called King's Mountain, noted for the battle fought on it during the Revolution. In the inner portion of the plateau the chains are larger and more numerous. In Greenville, Pickens and Oconee counties some of them rise 1,000 to 1,500 feet above the plateau floor upon which they stand, and their culminating point is reached in Mt. Pinnacle, 3,436 feet above the sea. The Blue Ridge escarpment, separating the piedmont and Appalachian regions, forms part of the northwestern boundary.

The rivers that drain the piedmont are the Savannah, the Saluda, the Broad and the Catawba. From these, side streams branch and rebranch until a perfect network is formed that gives the region thorough drainage. The small streams flow in narrow trench-like valleys. The main ones flow in larger, steep-sided valleys, that in the outer portion of the plateau are 50 to 150 feet beneath the general level of the region. The rivers here have broadened their valleys somewhat, and their flood plains, known as bottoms, form naturally the most fertile part of the region. The value of these bottoms has been much impaired by a careless system of farming, that permits much of the soil of the uplands and hill slopes to waste down into the valleys and clog the streams, making proper drainage difficult or impossible. Ascending the streams, the valleys become narrower and shallower, and, in their upper courses, . some of the rivers flow in gorges. Numerous falls occur here as the rivers encounter in their paths ledges of hard rock which they have not yet been able to wear away. Again on the outer edge of the piedmont plateau, as they leave it to enter the coastal plain, falls or rapids are developed. From them this line is called the "fall line." As will be seen later, these falls have played an important part in the development of the State, both as a source of power and as an obstruction to navigation.

There is a small portion of this piedmont region worthy of separate notice on account of its distinctive topography and vegetation. It is variously known as the black-jacks, meadow woods or flatwoods, and is found in detached areas in York, Chester, Union and Abbeville counties. As one of the names implies, the surface is either quite flat or but slightly rolling. The soil is a compact clay, almost impervious to water. Natural drainage is usually poor, and the vegetation is that characteristic of wet soil. The areas are, in origin, ancient igneous rocks, whose deep decay has given the topography and soil they now have.

The surface features of the piedmont tell of a time when the region stood still until its surface had been worn flat and stood but little above the sea-level. A harder mass here and there had not been completely worn away, and its remnant still rose as a mountain peak or broken chain. Since then the surface has had several movements up and down, at times standing higher than at present, then again sinking almost to sea-level. The last great movement was upward, and was accompanied by a gentle southeastward tilting. Since then, the re-invigorated streams have dug for themselves but narrow valleys beneath the general surface.

The coastal plain, which skirts the Atlantic and Gulf coasts, attains in this State a width of almost 150 miles. Its outer three-fourths lies low and level. No hills rise above it. No valleys are cut any distance below it. In this outer part the surface rises to the northwest, very gradually, attaining an elevation of only two or three hundred feet. In the remaining fourth, however, the rise is much more rapid, and the surface quickly becomes rolling and hilly, being more broken where the large streams enter it from the piedmont. This coastal plain region may be divided into a series of belts, that run roughly parallel to the coast.

Beginning farthest inland and going coastward, there is first a belt of sandhills that is very persistent and distinct. As the name implies, the surface is composed almost wholly of sand, and is broken and hilly. This belt varies from a few to twenty or thirty miles in width. Where typically developed its soil is quite poor.

Next, the red hills form an interrupted belt whose surface is in places more broken and hilly than the preceding belt, while its average elevation is nearly as great. The soil is a red loam that

is quite fertile. The High hills of Santee form a part of this belt.

The descent is quite rapid in passing into the next, or upper pine belt, and the hills characteristic of the preceding belts disappear. The surface becomes much more nearly level. It merges gradually into the lower pine belt, most of which is very level. The relief being but slight, the drainage is generally poor. Much of the soil is also poor. To this part of it, the name pine barrens is often applied. Swamps cover a large portion of this region.

Lastly, there is a narrow coast belt that skirts the Atlantic. It includes the sea islands, famed for cotton, the salt marshes, and a portion of the mainland that includes the truck farms and lower river swamps, with their rice fields. The relief is nowhere great.

The main river systems of the coastal plain are the Peedee, the Santee and the Savannah. These all have their upper portions on the piedmont. The secondary ones include the Ashley-Cooper, the Edisto and the Combahee. Their basins lie between the Santee and the Savannah, and are confined to the coastal plain. The character of the main rivers changes immediately on leaving the piedmont and entering this section. Their narrow, deep valleys become broad and wind with many a curve between low, swampfringed banks. Their rapid currents become slow and deep. Side streams are neither so numerous nor so well developed as on the piedmont. In the outer portion of this section, especially, the drainage in many places is poor.

Swamps constitute a good portion of the coastal plain, their area being estimated at 5,500 square miles. Those along the rivers are usually several miles wide. Like the flood plain of the Mississippi, they contain numerous ox-bow lakes and, here and there, have stringers, or narrow channels, that are given off from the main stream, but again join it. The swamps in the inter-stream area attain considerable importance. Near the coast, both classes reach a greater development and at last merge into the salt marshes that are flooded at high tide. Usually they are thickly overgrown with cypress and other valuable timber, and are made picturesque by the festoons of long Spanish moss that drape the trees.

There are in the State no lakes of importance. In western

Fairfield county there is a lakelet formed by the damming of the mouth of a small stream by a larger one that is rapidly building up its flood plain. In the river swamps ox-bow lakes are numerous. The largest of these is Lowther's lake, in Darlington county. There are some small lakes formed, as in Darlington and Barnwell counties, in basins or sink holes whose underground outlet has become stopped up. Swamp lakelets known locally as "bays" are also numerous.

Sand dunes are common along certain portions of the coast. A group of river dunes occurs on the Peedee as far inland as Darlington county. There are probably other evidences of similar wind action in the interior.

The coastal plain is a recently uplifted sea bottom, upon whose surface the drainage has not yet become well established. From the slightness of the uplift, the cutting of deep valleys has not been possible. The past history of the region has been complex, and its surface features have been fashioned at various periods. At least five times it has sunk wholly or in part beneath the sea and risen again. During these movements its surface has been warped and its streams readjusted. Since its last elevation, a sinking has taken place which is probably still in progress. This sinking or drowning has caused a slight submergence or drowning of several of the river mouths, as, for example, the Ashley-Cooper at Charleston and the Broad at Port Royal.

An examination of the coast line shows that it may be divided into two parts. From North Carolina down to Cape Romain it is smooth and gently curving. Southward from this point it becomes much broken. In the region near Port Royal, the indentations are very marked. Islands here fringe the coast in tiers three or four deep, separated by narrow cross channels. This part of the coast is the hollow of the crescent-like embayment between Cape Hatteras and Florida, and the tides coming in from the Atlantic might be expected to heap up somewhat in the recess. Furthermore, the ocean bottom slopes off less rapidly here than out on the horns of the crescent. Hence the tides sooner drag on the shallow bottom, and as a result are heaped higher here than they otherwise would be. It need not surprise one then, to find that the rise at exposed points near Port Royal is two or three times as

great as on the North Carolina or Florida coasts. It seems probable that this curious coast line may be at least partly due to the scouring caused by these stronger tidal currents confined in the narrow intercommunicating stream channels of the region. The smooth portion of the shore where the tides are lower and less powerful would seem to owe its shape to the smoothing action of the waves, aided by a southward sweeping eddy current caused by the Gulf Stream.

The climate along the coast is mild and equable. In the southern part snow rarely or never falls, and winter weather is scarcely known. Figs, olives and oranges ripen in the open air, and bananas may be grown with some protection. Going inland from the coast, the climate gradually changes, until, in the northwestern corner, the temperature occasionally falls to zero in winter. Cold waves last but a few days. Snow rarely remains on the ground long. In summer the heat is not as oppressive as it often is much farther north. The rainfall is ample and is well distributed.

The soils of the State vary much in quality and texture. On the coastal plain they are all alluvial, usually sandy and open, and moderately fertile. The swamp soil, however, is black with vegetable mould, and exceedingly fertile, while the sand hill soil is extremely poor. The soils of the piedmont plateau are sandy or clayey. They possess naturally a moderate fertility but are easily capable of improvement.

The more important mineral resources of the State include the phosphate deposits found on land in the beds of rivers near Charleston and Port Royal; the granites of Richland, Fairfield and other parts of the piedmont; the kaolins of Richland, Aiken and other counties. Gold-bearing rocks cross the State in two belts, one near the eastern margin and the other in the western part of the piedmont plateau. Iron, limestone, pyrite, monazite and other minerals are also found in the northern and western part.

(To be continued.)

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WINDS AND OCEAN CURRENTS.

There are certain characteristics that the earth possesses in consequence of being a large body of matter, the chief of these being its globular form. Being presumably hot within, and therefore yielding easily to unequal centerward forces, it has long ago assumed that form in which the centerward forces are equal. But even if cold through and through, it must be globular, for its constituents are not strong enough, though as rigid as solid rock, to maintain a non-globular form. And even if extremely rigid, it still must now be globular, for it is so old that all ancient inequalities must long ago have been weathered down smooth and almost level.

Globular form is a great convenience, but we are ungrateful enough to accept its benefits without much thought of their value. On the earth's surface gravity is everywhere about alike, hence the muscular exertion necessary in one part of the world for walking, flying or working suffices in any other part; hence a weapon or an utensil that man can use in one region can be used as well in another as far as its weight is concerned; thus migration is facilitated. Being globular, it has none of those very long ascents or descents which would so greatly retard migration and transportation on an earth of any other shape. The great impediment to travel resulting from a mountain range, a very small departure from globular form, illustrates the value of the relatively level surface of the earth as a whole. Being globular, the density of the lower atmosphere is everywhere nearly the same; adaptation to it in one region fits an organism to occupy it in another.

Rotation seems also to be an essential characteristic of all planetary bodies. Good reason for this is found in those speculations that account for the earth as the aggregation of many smaller bodies, once widely separated; and hence some confidence may be given to the speculation. Rotation has a slight effect on form, but the flattening at the poles is so small a matter that it does not deserve the attention it receives in the usual teaching of elementary geography. The mental image that is formed after reading the ordinary paragraph about the flattening at the poles is

always flattened too much. I would gladly see all mention of this minor topic omitted until the pupil reaches an age when he can appreciate the evidence that the earth is flattened, and the physical principles that explain why it is flattened. In the meantime, to escape the criticisms of those purists who would object to giving the name, sphere, to a body that departs relatively by only a hair's breadth from a truly spherical form, I would call the earth a globe.

Rotation in the neighborhood of a hot and luminous sun is a most convenient habit, for it warms up the largest possible area of surface that can be warmed by a single sun, and maintains it at a habitable temperature, leaving only the polar areas to freeze. It imposes on most organic forms the habit of periodic activity and rest. It furnishes us with a simple unit of time and a natural system of cardinal directions, which even many savage tribes perceive and use. It further enables us to find our position with relation to other places on the earth; to guide our course even on the trackless seas; and to parcel out great land areas for governmental administration in advance of occupation, in the most orderly manner.

This neighborhood of the sun to the plane of the equator determines, as above implied, a warm torrid zone and cold polar areas; these important planetary characteristics being intimately bound up with all the others, above mentioned. But on account of the oblique attitude of the earth's axis with respect to the plane of our orbit, seasonal changes of sunshine, of day and night length, and of temperature are introduced. There we first encounter a variation from the simple planetary habit, giving to the greater part of the world a second and longer period of activity and rest, superposed on the diurnal period. All phenomena thus dependent on the attitude of the earth's axis may be called terrestrial. the longer seasonal period does not seem to have been a notable advantage to plants and the lower animals, it certainly does seem to have been a fortunate factor in the development of the higher races of men.

The activities of the atmosphere manifest a distinct planetary habit in the constant circulation between the warm equator and the cold poles; the various lower members of the circulation being known as the trades, the prevailing westerlies, and the polar winds, with

intervening belts of light variable breezes and calms. A distinct terrestrial modification of the planetary habit is seen in the north and south migration of the several wind belts, following the sun; and in the seasonal variation in the velocity of the winds, especially in the prevailing westerlies, which are notably stronger in the winter than in the summer hemisphere.

Perhaps the most peculiar terrestrial modification of the planetary winds is the development of the subequatorial monsoons, the deflected extension of the normal trade wind when it crosses the geographical equator on the way to the meteorological equator.

The activities of the ocean manifest an equally well defined planetary habit, in the systematic eddying of the surface currents around the several oceans; the eddies being a direct consequence of the winds that brush the waves forward, and indirectly a consequence of the form, the rotation, and the other planetary characteristics of the earth. All these elements of activity are linked together, so that they may fairly be spoken of as the machinery of the earth. On a planet constituted like the earth, with large oceans and a thin transparent atmosphere, it is just as inevitable that the surface eddies of the oceans should swing around with their appropriate boreal and austral* order of turning, as it is for the sun to rise in the east and set in the west, or for the winds to blow along their established courses. If we would perceive the true relations of these great physical phenomena, it is essential that they should be regarded as correlated parts of a whole; not as independent matters, cut asunder like the chapters of a disjointed book.

The currents manifest not only planetary features, but terrestrial features also. They move slightly faster in the winter hemisphere, and from this fact alone, we find much confirmation of the theory that ascribes the currents to the prevailing winds. According to a view that has been impressed upon me increasingly in recent years, the counter currents of the equator (better called the subequatorial currents) are also purely terrestrial features of the

*By boreal is meant a habit peculiar to the northern hemisphere; and by austral, peculiar to the southern. Thus, the ocean surface eddies of the northern hemisphere turn, when looked at from the centre, from left to right, or in boreal fashion. The eddies of the southern hemisphere turn the other way, or in austral fashion.

oceanic circulation; for they are linked with the monsoons or reversed winds of the subequatorial belts. I do not propose to dwell on the detail of fact or correlation here, having lately discussed the matter in the Scottish Geographical Magazine, for October,* 1897; but it does seem worth while to emphasize the grouping of planetary and terrestrial activities, partly as a means of understanding them, partly as a guide to the order of their presentation in teaching. Day and night, trade winds and prevailing westerlies, systematic boreal and austral eddy currents, are all planetary features. Change in the length and strength of sunshine, change in the strength and position of the several wind belts with the introduction of monsoons in the subequatorial belts, and change in the velocity of the surface currents with the addition of the subequatorial counter currents, are all terrestrial variations from the simpler planetary scheme.

One of the essential consequences of the systematic eddying of the surface currents is that, in a broad way, the isotherms of the ocean surface, and of the lower atmosphere on the oceans, diverge or spread apart westward across the torrid zone; while in the temperate zone (faintly in the southern hemisphere, but conspicuously in the northern hemisphere) they diverge eastward. As a consequence, we find an equable distribution of climatic features over a great stretch of latitude in western Europe; and as pronounced a contrast of climatic features crowded together along the eastern margin of North America. This is one of the most wonderful climatic peculiarities of the world, and it is founded inevitably on the planetary habit of the earth. It must be so, if the earth turns from west to east. West may not only be defined as the direction towards sunset; but as the direction towards that side of a temperate ocean where the isotherms are crowded together. the marvellous continuity of control that impresses me in all this; the close association of all these many different phenomena. There was a time when the rising and setting of the sun did not lead to a belief in the earth's rotation. The time still is with too many

In this, as in various other articles contributed to the JOURNAL, it is the desire of the Editors that fuller statement should await rather than anticipate the wishes of our readers. If it is the wish of a number of readers that this topic or any other should be discussed at greater length, an expression of that wish by correspondence with the Editor will probably lead to its accomplishment.

when no such belief is suggested by the comparatively close approach of warm Florida and cold Labrador, in contrast with the distant separation of warm Morocco and cool Norway. The earth's rotation may be inferred either from the simple phenomena of surise and sunset, or from the more complex phenomena of these climatic contrasts. Both sets of phenomena are essential consequences of our planetary habit.

The terrestrial habits seen in the monsoon winds and in the subequatorial counter currents may also be taken not merely as consequences of the earth's rotation, but as proofs of it. The argument here necessary is longer and to-day less rigorous than that based on sunrise and sunset; but I doubt if anyone could avoid believing that the earth rotates from west to east if he thoroughly understood the monsoons and counter currents, especially in their wonderfully typical development on the Indian ocean. He might know nothing about sunrise and sunset; but if he knew all the facts about winds and currents, he would have to conclude that the earth is a globe, rotating on an axis that stands oblique to the plane of the sun's (apparent) annual revolution. A student who wishes a good subject for argumentative composition might try his hand at the following: Is a more satisfactory proof of the earth's rotation obtained from sunrise and sunset, than from the behavior of the monsoons and counter currents of the Indian ocean? Neither argument is so very simple, if it be made rigorous. The first would compel belief from its simplicity and directness; the second from the wonderful success of the simple process of rotation in explaining the complicated changes of winds and currents.

There are many other headings under which winds and currents might be studied, and each heading has its interest and value; but none inspires the student with so strong a feeling of wonder at the mechanism of the world as that which brings all the parts of the machinery into their proper connection.

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TRADE RELATIONS OF THE UNITED STATES WITH THE NORTHERN COAST OF SOUTH AMERICA.*

A glance at the map of the Western Hemisphere will at once reveal the fact that the advantages of location of the United States in the competition for Caribbean trade, which apply so strikingly to Mexico, Central America and the West Indies, extend to the whole coast line of South America on the Caribbean Sea. A line drawn due south from New York through the Windward Passage, between Cuba and Haiti, would strike somewhere near the port of Carthagena, on the north coast of Colombia. Another line running southeast from New York through the Mona Passage, between Haiti and Puerto Rico, would end at La Guaira, the seaport of Caracas, the capital of Venezuela. A third line, trending further to the eastward, marks the route from New York to the Windward Islands, including Barbadoes, and thence to Demerara (Georgetown), British Guiana.

Taking Barbadoes as a starting point, the distance to New York, 1,829 nautical miles, is about one-half the distance to Liverpool, England, 3,705 miles. The difference in favor of United States ports increases going westward, so that, roughly speaking, the great commercial centres of the Atlantic seaboard may be said to be from one-half to two-thirds nearer the Caribbean ports of South America than are their European rivals.

The disparity is, of course, much greater in favor of the principal cities along the Gulf coast of the United States. Mobile, New Orleans and Galveston are points of vantage for the Caribbean trade of South America, which only await the stimulus of active effort to give them commanding positions as outlets for the manufactures and raw products of immense stretches of United States territory seeking markets in South America, as well as in Mexico, Central America and the West Indies, and as centres of distribution for the imports from the United States from this vast region.

Communication between the great Valley of the Mississippi and the northern coast of South America would run in a straight line from northwest to southeast, past the western extremity of Cuba.

^{*}Reprinted from the Bulletin of American Republics for November, 1897.

It is an interesting fact, of great practical importance, that any one of the many steamship courses from the United States to the Caribbean ports of South America provides a "half-way place" for coaling, refitting and profitable trade at some one or more of the islands of the Greater or Lesser Antilles.

Colombia naturally presents itself first in the consideration of the trade conditions of this portion of South America, since it is most closely affiliated, by its location, with the North American continent. One of its departments, Panama, is geographically a part of Central America, and for many years has been the only great highway for interoceanic traffic between the Caribbean Sea and the Pacific Ocean. The Republic of Colombia has an extensive coast line on both the Atlantic and Pacific. Its relations with the United States have long been more or less intimate. It was United States enterprise and capital which built the interoceanic railroad from Colon to Panama nearly half a century ago. completion of the Panama canal, if ever accomplished, would, notwithstanding the work was initiated and is now being prosecuted by the French, contribute most to commercial intercourse with the United States.

Colombia is known to be rich in mineral resources and to be capable of an immense output of coffee, cacao, tobacco, fibres and other agricultural products which command a ready market, at renumerative prices, in the United States. The share of the United States in the commerce of Colombia is not what it should be nor what it could easily be made. In recent years, France, owing doubtless to her large outlays for the Panama canal, has held first place, with Great Britain second, and United States third. half the British exports to Colombia is in cotton goods, in the manufacture of which the United States excels. With proper effort the greater part of this trade might be diverted to the United States in exchange for Colombian products which the United States could readily absorb. The figures of the past year, however, show gratifying gains for the United States, both in exports and imports. The exports to Colombia increased from \$2,784,634 in 1894 to \$3,382,588 in 1896, and the imports from \$2,234,887 to \$4,843,256, the gain in the latter being chiefly in coffee and in hides and skins, due to changes in the United States tariff—a fact

significant of the value of reciprocal concessions in the Latin-American trade.

The chief obstacle to the extension of United States trade at present seems to be the higher prices of certain goods as compared with European, and the lower freight rates to and from European ports, notwithstanding the distance from some ports is three times as great. That these impediments are but temporary would seem to be obvious from the fact that United States manufacturers are now selling in competition with European manufacturers in the home markets of the latter. It is probably only a question of time when the same kind of rivalry will meet the European merchant of South America under conditions much less unfavorable to The problem of cheap and rapid transportathe United States. tion becomes one of prime importance in this competition, and until the United States builds up an efficient merchant marine upon the Caribbean Sea it cannot hope to reverse the present conditions.

Venezuela is the one republic of South America which recent political events seem to have marked out preëminently for the closest affiliation and intercourse with the United States. The assertion of the vital principle of "America for Americans," which was made in her behalf against the pretensions of the greatest maritime power in the world, has naturally engendered a warmer feeling among the Venezuelan people for the United States, and it rests only with the capitalists and merchants of the latter country to avail themselves of the national good will to cultivate enterprises and business intercourse which would redound to the advan-Since the removal of the retaliatory duties imposed tage of both. by the United States on Venezuelan coffee and hides, there has been a marked revival of trade, and an equitable tariff agreement for the exchange of products which would doubtless put the trade of the two republics upon a permanently prosperous basis.

The administration of President Crespo has secured to Venezuela a period of peaceful development which has had the happiest results and bids fair to continue. The recent action of the National Association of Manufacturers of the United States in sending a representative to Caracas to establish an agency there is the initiatory step, it is to be hoped, in a serious movement to reap

some practical benefit from the exceptionally favorable conditions which now exist. The United States, in the past, has taken the great bulk of Venezuela's more important products and is doing so again. Venezuela, on her part, would import the greater part of what she needs from the United States if the latter would offer her as favorable terms as to prices, terms of credit, freight rates, etc., as Europe does. The United States now buys from Venezuela annually about \$10,000,000 worth of products, and sells her \$4,000,000 worth. It is not at all improbable that the figures could be made to balance if the United States should put forth concerted and energetic effort in lines of manufacture in which she has so clearly proven her ability to lead. Great Britain has sold to Venezuela great quantities of cotton goods, machinery, implements and tools which the United States is now in a position to supply.

In a recently printed report, the British Consul at Caracas admits that certain articles, such as agricultural implements, "are obtained cheaper and quicker from the United States." also a demand for mining plants and railway supplies which the United States is well able to furnish against all competition. cotton prints and piece goods England, we are told, still holds her own, but the enterprise just started by the National Association of Manufacturers may have as one of its results, the diversion of this important branch of trade to the United States. mans rather than the English whom the United States has to struggle with in Venezuela. The largest firms in the country are German, and their industry and perseverance in assimilating themselves to the people and thoroughly familiarizing themselves with local customs and business habits make them a powerful factor to be reckoned with. German capital has invested largely in Venezuela, and it is only by means of similar liberality and application that United States manufacturers and exporters can hope to make the most of the undoubted predilection for their country. Sentiment and a community of political interests count for much in trade, but only where they are supplemented by active effort. Most of the steamshipping of Venezuela, unlike that of other South American countries, flies the flag of the United States, the Red D Line, plying between Maracaibo and New York, having a record during 1896 of sixty-five steamer arrivals and sailings.

During the year, no steamers of any other nationality appear in the returns, but one British, three United States, twenty-three Dutch, and one hundred and forty Venezuelan sailing vessels cleared from the port of Maracaibo. This is a gratifying exhibit for the United States and shows what might be done in every part of the Caribbean Sea.

The Island of Trinidad, a British colony lying off the delta of the Orinoco, the great waterway of Venezuela, would seem to be a menace to the development of trade relations with the United States, but, like other European dependencies in the Caribbean Sea, it finds its natural market and also its most convenient source of supplies in the United States. The latest colonial report from-Trinidad to the British Foreign Office, dated June 17, 1897, shows that Trinidad imports half as much from the United States as from Great Britain. The imports of Trinidad amount, in round numbers, to some \$12,000,000; its exports, to about \$11,000,000. will be seen, therefore, that its commerce is very valuable, and, with the extension of transportation facilities and the cultivation of relations which already exist, the United States may reasonably expect to gradually absorb the greater part of it in connection with the development of its Venezuelan trade. Trinidad imports over \$5,000,000 worth of manufactured goods, and nearly the same amount in live animals and provisions. Its leading exports are sugar, cocoa and asphalt. About three-fourths of the asphalt is already taken by the United States, which also consumes more than half the production of sugar, and about one-fifth of the exportation of cocoa.

Both Venezuela and the Guianas offer tempting opportunities for American enterprise and capital in the development of the gold industry, which is situated chiefly in the territory in dispute between Venezuela and British Guiana. Citizens of the United States were among the pioneers of gold mining in this region. There can be no question of the great richness of the gold deposits. It is now thought to be more than probable that it is the "El Dorado" which was sought in vain by Sir Walter Raleigh and other adventurers more than two centuries ago. However this may be, the fact is well established that gold exists in paying quantities in various parts of the Guiana region, and there will undoubtedly be

openings, not only for mining enterprise, but for the sale of mining machinery and supplies, and, with the influx of immigrants attracted by gold, a demand for a great variety of manufactured articles. British Guiana already imports from the United States from one-third to one-half as much as from Great Britain. In 1896 she exported to the United States nearly two-thirds as much as to Great Britain. The United States took more than twice as much of her sugar, the principal agricultural product, as did Great Britain.

The difference in exports is due, in fact, to the gold output, which went exclusively to Great Britain, amounting in 1896 to more than \$2,000,000. Subtracting the gold exports from the total, the United States already consumes more of the agricultural products of British Guiana than the mother country. As almost everywhere else in the Caribbean Sea, the United States may be said to occupy a secondary place only because of the lack of proper effort. It is not a matter of speculation as to what may be easily accomplished in the development of trade relations with the whole of this region, for the facts cited, as well as the detailed figures of trade, show that, with no concerted action on the part of the United States manufacturers and exporters, but simply through the natural tendencies of trade, the commerce of all these countries gravitates steadily toward the United States.

The elements of future success in utilizing the geographical, political and economic relations which already tend so strongly in favor of a community of interests between the United States and the whole of the Caribbean region, are, in my opinion:

- I. The careful adjustment of tariff relations by means of reciprocity arrangements, which will secure to each party the consumption, by the other, of all products which are needed, and do not enter into competition with home industries.
- II. The speedy development of means of communication by the establishment of regular lines of fast steamers with large freight capacity, which shall be owned and manned by, and fly the flag of, one or another of the American Republics.
- III. The assimilation of United States trade methods and manufactures to the customs and tastes of the different localities. What would be suitable for Mexico might be useless for Venezuela;

goods which could be sold in Haiti at a profit might accumulate on the counters of the merchant in Colombia or the Guianas. Some of the islands of the Caribbean Sea depend upon the United States almost absolutely for certain food supplies. The northern coast of South America, on the other hand, wants its improved machinery, railway supplies, agricultural implements, cotton goods, etc.

With the solution of the three problems indicated, there is no question, in my opinion, of the rapid expansion of United States trade from the Rio Grande along the whole coast line of Mexico, Central America, and the northern part of South America, to the eastern boundary of French Guiana, including the islands of the Caribbean Sea. The time is opportune for this development and expansion of American trade between the American people, as the change in political conditions in the Western Hemisphere happily corresponds to the marked awakening in interest in the United States Latin-American trade. Immediate action by the United States is also being urged by important and influential trade associations, to meet the increasing rivalry of Europe. For example, a recent report of a Committee of the National Association of Manufacturers of the United States says: "In a short while it will be idle to discuss the question. The campaign must begin now, else this trade will pass forever from the control of the United States, and the increasing needs of the countries to the south of the United States will be supplied by Europe." On the other hand, the United States, once earnestly embarked in this great enterprise, may look to the future with a confidence fully justified by the conditions I have endeavored to set forth, and by the recent success, in competition on their own soil, with the leading industrial nations of the world.

JOSEPH P. SMITH.

NOTES.

Queensland.—The whole of the country is naturally divided into but three great primary regions, each possessing distinctive physical and climatic characteristics. The eastern division comprises the whole of the immense tract of country flanked on the

east by the coastline, and on the west by the Great Dividing Range. It is abundantly watered by the copious rainfall that is everywhere distributed over its surface throughout the year, and by the numerous rivers and small streams that traverse it. The climate of this district varies from a mild tropical type to one of the most invigorating and health-giving temperate zones of the world. The remarkably fertile soils are of the richest and most varied description. They comprise the immense alluvial deposits of river basins, the volcanic ejectments of tablelands, and the loams of the slopes. The forests are rich in valuable timbers and everywhere teem with animal and bird life; whilst, within the tropical belt, prolific nature has clothed the surface with vegetation of unsurpassed luxuriance. Here the various scrubs are remarkable for the charm of beauty and often are dense enough to exclude the rays of the sun. The mountain and woodland scenery is very beautiful, and the adjacent island landscape delightful, the climax of grandeur being attained in the mighty waterfall of the Barron river, that may justly rank among the first of the kind on the globe. In flood-time it is said that the wild sublimity of the scenery here is awe-inspiring—the rush and noise of the turbulent and sweeping flood-waters being indescribable, as they madly leap over the edge of the shelving precipitous rocks some 600 feet high.

The second geographic division comprises the whole of the watershed of the Gulf of Carpentaria. It lies wholly within the tropical belt, and is made up chiefly of extensive plains and undu-The country is especially adapted for pastoral lating lands. rather than agricultural purposes. There are, however, several scattered areas of remarkably rich, deep, loamy soil, mostly in the basins of the Batavia and the Embley rivers, on the eastern side of the gulf, that could be cultivated. There are fine forest timbers here, and the whole district is abundantly watered. The rainfall is copious, and many rivers traverse the country, chief among them being the Flinders, the Mitchell, the Gregory, the Leichhardt, the Norman and the Batavia. Several of these are navigable, although the extensive mud-flats along the shores of the Gulf greatly interfere with the free movements of large vessels. As a first-class pastoral country, the district possesses many natural advantages that are entirely wanting elsewhere.

first of all, abundance of water, and the grasses are abundant and nutritious. At the mouths of the Batavia and Embley rivers there are commodious harbors, where stock could be shipped, and every facility exists for the establishment of industries and the further development of the resources of the country. The drawback hitherto has been the distance from the capital of the colony, but, as railway extension is now being rapidly carried on everywhere throughout the country, the disabilities with which the district has formerly had to contend will not much longer impede its progress.

The third great division is the largest of all, and, in point of importance, only second to the first one. Indeed, it may be considered that this magnificent western district, comprising as it does the whole of the immense country west of the coast range, is in some respects superior to the others. It embraces the famous Downs country, which for richness of soil and magnificence of climate is probably unsurpassed in any part of the world. Extending far away to the west, into South Australia, these fertile plains and rolling downs cover enormously extensive Cretaceous beds, holding artesian water at varying depths. The irregular, uncertain and always scanty rainfall of the far western district was formerly a great drawback to pastoral enterprises. During seasons of prolonged drought, run-holders suffered greatly by loss of stock, for over the vast surface of the rich soil no grass could be obtained and other forms of vegetation were parched and withered. Now, there is happily a complete transformation of the face of the country. Stern and relentless nature has been subdued by the art of man, and vegetation now flourishes luxuriantly on the surface of soil abundantly watered from artesian sources, whilst thirsty stock no longer wander madly and helplessly about over parched plains in quest of much-needed water. The main trunk lines of railway extend far away towards the western frontier, and the country is becoming settled in places where formerly not a single habitation was In many parts the land is covered with several varieties of dense low forests of acacia, A. homalophylla, A. harpophylla and other varieties of "scrubs" as they are locally called. Where these occur they impart to the landscape a most picturesque and agreeable aspect, whilst the umbrageous protection they afford

from the solar rays render their presence everywhere welcome. The soils are generally black, sandy and brown loam, varying in depth from a few inches to ten feet or more. They are eminently adapted for fruit-growing and agriculture, as well as for grazing purposes.—Scot. Geog. Mag., November, 1897.

Date Iudustry in Persia.—One of the most interesting, profitable and growing industries in Persia is date farming. The date palm is indigenous in the south, and its cultivation is confined to a tract running parallel to the Persian Gulf from the borders of Beloochistan on the east to the Disful river on the west, and ex-Palm groves, however, tending about 150 miles into the interior. by no means absorb the whole of this area. They are chiefly confined to sheltered valleys and plains exposed to a high temperature in the summer and having a very mild climate in winter. The palm requires a great degree of heat for the ripening and perfection of its fruit, and is consequently, considering the size of the trunk, extremely sensible to cold. This arises chiefly from the fact that the vital portion, or that which is most easily affected by outward influences, is the crown or head of the tree. If this be severed or frost-bitten, decay immediately sets in and the plant dies. On this account, it is often considered the connecting link between the vegetable and animal kingdoms, and those who cultivate it and depend upon it for support look upon it with a large degree of veneration and respect.

With the most favorable conditions for growth, the plant will not bear fruit under from eight to ten years. It attains a height of 50 to 60 feet and lives upward of a hundred years. If, on the contrary, the influences of climate and soil are not suitable, it will produce fruit in four years; but the life of the tree will not be prolonged beyond twenty years, and the fruit is of an inferior quality.

The chief requisite for the production of fruitful and profitable palms is a high degree of temperature in the summer—not less than 110° degrees in the shade. The water and soil should, if possible, show a low percentage of saline and alkaline qualities, or, to use the local term, they should be "sweet." As rain seldom falls in the southern littoral of the Persian Gulf between April and December, the palms are supplied with moisture by irrigation; and

where this cannot be provided, the cultivation cannot be undertaken, that is, so far as the Persian area is concerned.

It is reported that the date palm will not flourish within a distance of 25 miles from the sea. If this is the fact, it is probably owing to the impregnation of the atmosphere and the soil with an excessive percentage of salt; and this would seem to be in accord with the general principles observed in the selection of sites for the groves. A very important point observed in the cultivation of the groves is to have a proper proportion of male and female palms, for, unless there be sufficient pollen for the process of fertilization, the plants will be unproductive. It appears from this that some technical knowledge is required for the successful management of the groves.

The production of the Persian palms is about 500,000 cwts. per year, nearly half of which is exported to India, Europe, America and Africa. The customs valuation is about 85 cents per cwt. The dates produced in Persia and shipped from the gulf ports are hardly equal in size, flavor, and richness to those exported from Bassorah. This is doubtless due to the more careful cultivation by the Arabian and Turkish producers.

In addition to the consumption of the dates in their raw state by the natives, considerable quantities are used in the manufacture of sirup, vinegar and a liquor called "arrack," none of which are, so far as I know, articles of exportation.

There can be no doubt that, if conditions of climate, soil and water suited to the growth of the palm could be found in the southern or southwestern States, a very profitable industry might be introduced for the benefit of the American people.—Consular Reports, November, 1897.

To the Editor of the Journal of School Geography:

It has been my desire to see the JOURNAL used as a medium for the discussion as well as for the presentation of geographical problems. There must frequently be difference of opinion on geographical subjects, either as to matter of fact or as to manner of description. Difference of opinion may lead to dissensions; then it is of little avail. It may lead to new considerations; then it is profitable. Hoping for the latter result, I take the liberty of submitting a fewp aragraphs to you and your readers.

In Professor Cobb's account of his State in the November Jour-NAL, I miss the "causal notion" whose importance was so well emphasized by Professor McMurry in the February JOURNAL. For example, "North Carolina is well watered and well drained" (p. 262). This is an empirical statement, without correlation or explanation. As the omitted correlations are perfectly familiar to Professor Cobb, I presume their omission was intentional on his part. But is it not worth while constantly to hold before our attention why North Carolina is well watered and well drained? May not the teacher, who takes this essay on North Carolina as a type for her teaching about that State, repeat the statement "well watered and well drained" in its brief empirical form? In contrast thereto, I should prefer a brief correlated statement; "North Carolina being on a coast in the temperate zone receives a plentiful rainfall from the storms of the prevailing westerly winds. It is one of those regions that has been long exposed to stream and river action, and is therefore well drained and prevailingly free from lakes." Correlated statements of this kind are necessarily longer than empirical statements; but their increase in educational value is greater than their increase in length.

Again: "Many swamps * * * very unlike ordinary swamps, occupy the watersheds between rivers and sounds, and are the sources of rivers" (p. 263). Here is so good a chance to introduce a correlation that it is a pity to leave it out. Might not these swamps be introduced as follows: "Some of the low and flat interstream areas of the coastal plain are occupied by swamps: these being examples of the obstruction of slow drainage by active plant growth. The streams have actually been unable to denude the land surface; it has been built up into swamps by plants, and the swamps are often the sources of rivers."

"The coastal plain is an old sea bottom that received the waste of the land in an earlier age" (p. 259). This I should like to see replaced by some such statement as the following: "The coastal plain offers an excellent example of that important group of geographical forms that are added to continental borders when a change of relative level of land and sea reveals a former sea bottom, sheeted over with waste from the ancient land." The object here is not to enter thoroughly into the evolution of coastal

plains, but to suggest that North Carolina possesses an excellent example of that kind of thing. Referring to the "sounds" and "banks" I should go on to say; "As is usual on coastal plains, signs of changes in level are seen in the shallow arms of the sea, or "sounds" that indent its coast line; and the characteristic marks of wave work, performed since the present attitude of the land was taken, are seen in the off-shore sand reefs or "banks," that so commonly fringe the margin of coastal plains."

As to the origin of the "banks," I question whether one of the causes suggested to account for them is appropriate. "The inflowing tides have also set back the rivers, quieting their waters and causing them to deposit the detritus brought down from the land" (p. 259). If this is an actual process, it may aid the deposition of marsh muds in the lagoons behind the "banks;" but it seems to me a very subordinate process in making the "banks" themselves if applicable there at all.

Turning to the paper on Crater Lake by Mr. Diller, I regret that he did not call the great cavity in which the lake lies a caldera. The water will doubtless always be called by its popular name, Crater Lake; but the cavity that it occupies deserves distinction from a crater, in a geographical account of its remarkable features. A typical crater is formed in eruptions where accumulations of lava and ashes are built up around the vent; it does not imply any pre-existent form; its materials are arranged in rough layers, slanting inwards on a short slope and outwards on a longer slope. Like everything else, the cone and the crater will show signs of wear if exposed to the destructive action of the atmosphere; so we may find many crater-bearing cones in a stage of greater or lesser dissection, until at last the crater disappears.

But a typical caldera is a large cavity in what was once a cone of great size. After the cone had been built by many eruptions to a great height, very likely bearing a crater at its top, and after it had been more or less dissected by radical streams, the greater part of the cone may be destroyed by explosion or engulfment, by blowing out or falling in. The cavity thus formed is a caldera. The inner walls of a caldera exhibit broken lava beds. Its outer slope and the crest of the rim may be cut by valleys, whose upper courses once began near the summit of the vanished

cludes Upper and Lower New York city, Brooklyn, Richmond county, Flushing, Port Hempstead, Jamaica, Long Island City, Newtown, Jamaica Bay, Eastchester, Westchester and Pelham—a total area of $359\frac{8}{10}$ square miles. Philadelphia has 129, or one-third as great; Chicago, 180, one-half; Greater London, 688—twice the size.—Jour. of Ed., June 24, 1897.

The Russian Coasting Trade.—A very important measure in regard to the coasting trade between Russian ports, and having for its object to benefit vessels sailing under the Russian flag, was sanctioned by the Emperor last May, and will take effect on the last of January, 1900. Heretofore, the Russian coasting trade has been free to vessels from any country, but after the said date it will be limited to Russian vessels, with the exception of the transport of salt from the ports of the Black Sea and Sea of Azov to the ports of the Baltic. A similar law had already been passed in 1830, but on account of the insignificance of the coasting trade then, it remained a dead letter, and said trade was left unprotected from foreign competition until now. The coasting trade has developed to a large extent, and Russia, recognizing, in common with other countries, the importance of the commercial marine, is making great efforts to encourage it and is adopting measures to place her coasting trade exclusively in the hands of her national flag.

Owing to the isolated situation of the seas surrounding Russia, separated as they are by foreign territories, the Russian coasting trade must cover long distances, such, for instance, as the United States trade between New York and San Francisco, which must pass around South America. Although not enjoying any privileges, the Russian coasting trade was always increasing, and during the period from 1888 to 1895 it more than doubled.—Consular Reports, Nov., 1897.

Population of Johannesburg.—Founded September 20, 1886, Johannesburg is to-day one of the principal cities of Africa. According to the census of July 15, 1896, the city now has 102,078 inhabitants living within three miles of the market place. Of this number 50,907 are whites; 42,533 Kaffirs; 4,897 Hindoos and Chinese; 2,879 half breeds and 952 Malays. Four-fifths of the

population are less than 30 years old. As to nationality, there are about 8,000 Boers, 34,020 English, or immigrants from English Colonies and the Cape; 3,335 Russians; 2,262 Germans and 3,200 emigrants from other countries of Europe. The great proportion of English, as well as the small number of citizens (1,555), explains in part the dangers of the political situation in the Transvaal. Among the blacks, even, 754 only are natives of the Transvaal, 27,468 coming from English countries.—Annales de Géographie, May, 1897.

Ancient Roads of Peru.—Taking a glance, in passing, at the "New World," amongst the greatest of the world's road-makers were the Incas of Peru, whose ancient civilization and paternal form of government, extending over 500,000 square miles of territory, and 2,500 miles of coast line, were destroyed by the Conquistadors under Pizarro and other ambitious, unscrupulous and treasure-seeking Spaniards. The road from Quito to Cusco, which was some 1,500 miles long and forty feet wide, was formed with stones ten feet square, and was planted with avenues of trees, and supplied with running water. Attaining levels of 14,-000 feet and more above the sea, it passed over pathless and, at certain seasons, snow-clad sierras, through leagues of rock tunnels and across great streams and torrents; and was carried over the ravines of the Andes by masonry built up solid from their greatest depths. The bridges across the mountain streams were from 100 to 250 feet in length, suspended at giddy heights, and constructed with the frailest of materials—cables and ropes of twisted osiers and vines stretched from bank to bank, bound together and floored with bamboo or timber. The roads across the Andes, in Central Peru from Callao and Lima, and in Southern Peru from Mollendo and Arequipa, have been superseded by railways now operated by the Peruvian Corporation—the Galera tunnel on the Central Railway being at the same height as the summit of Mont Blanc, some 15,665 feet; and the Southern Railway reaching Lake Titicaca, 100 miles long by 60 miles wide, and 12,500 feet above the sea, at Puno, after passing a summit of 14,666 feet. The steamers on the lake belonging to the Peruvian Corporation carry goods and passengers to and from Bolivia, and copper ores from the Corocoro mines along the Desaguadero river. The shallows and marshes connected with this river, as it leaves the lake, form a most interesting home for water-fowl of all descriptions; whilst over vast areas of Pampas in Peru and Bolivia, at 13,000 or 14,000 feet above the sea, are llamas, alpacas, vicunas, cattle and sheep.—Scot. Geog. Mag., July, 1897.

Questions answered.—Why do springs near enough to the ocean to rise and fall with the tides yield fresh water? Ans. Because the influence of the ocean tides is intermittent, while the supply of underground fresh water is constant, and hence there must be times when the water flowing is fresh, and even when tide is high it must be partly fresh or brackish.

Why do the wells of Hawaii, known to the "denizens" of the island as "artesian," sunk through alternate layers of coral rock and volcanic dust yield fresh water? Ans. Because the layers of rock are not horizontal, and the water soaking into rocks on upland land surface, follows layers downward until tapped by wells, when it comes to surface by hydrostatic pressure.

Can you take time to tell me why there are great forests in the Amazon basin and such a lack of forest growth in the Mississippi basin?

The great forests of the Amazon are due to high temperature and plentiful rainfall. Where the temperature is low, as on the mountains at the western headwaters of the Amazon system, or where the rainfall is of moderate amount, as on the campos about the heads of some of the southern branches, tree growth is scattered or wanting.

The Mississippi basin, east of the Mississippi and south of the Ohio, is part of the great forested area of eastern North America, one of the greatest continuous forested areas of the world. North of the Ohio and westward for a state's breadth beyond the Mississippi, much of the country is prairie land, fertile, but naturally free from trees except along the water courses or on occasional ridges or uplands. The absence of trees on the prairies is not due to deficient rainfall, nor to severity of winter cold; for, as just stated, trees grow in certain parts of the prairie region. The

character of the soil, and the former frequency of fires set by the Indians have been advocated as competent causes of treelessness. In the region of the Great Plains, trees are wanting on account of the small rainfall. The Black Hills rising above the Plains to a moderate height and thus receiving more rainfall, have an abundant tree growth.

EDITOR.

REVIEWS.

The World and Its People. A Series of Geographical Readers in Seven Volumes. Edited by LARKIN DUNTON. Silver, Burdette & Co., Boston.

The recent appearance of a new volume in the series of geographical readers noted above, offers a favorable opportunity for reviewing the series as far as published. The volumes in order are entitled First Lessons, Glimpses of the World, Our Own Country, Our American Neighbors, Modern Europe, Life in Asia and Views in Africa, and thus by their sequence furnish a logical order for pedagogical development of geography work. The books of the series are, however, not of uniform quality or value, partly owing to the fact that they are graded and partly because of the manner in which the various topics are treated. volume entitled First Lessons offers some very helpful and applicable suggestions regarding the teaching of direction, distance and the simpler elements of home geography, including the using and understanding of maps. The best book of the series is the one entitled Our American Neighbors, in which the author gives a careful, well arranged, and interesting description of the life, manners and customs of those people around us who are so often neglected in teaching. The chapters on Canada and South America are interesting and helpful reading even for an adult, praise that cannot be bestowed on many books of description written for youths. The author writes as if from intimate acquaintance and gives one a faithful picture of the people from the standpoint of an observing resident and not a railway traveler. Of the volumes treating the eastern continents, the one entitled Modern

Europe is the best. The chapters are short, clear and interesting and full of helpful illustrations for the teacher. In the latest volume, on Asia, the author presents much of interest, but the thoughts are not well arranged, and the book is not as helpful as it might well have been. The volume on Africa is well described by its title "Views," for it does not treat this little known continent as well and fully as might have been done.

The type is good, the paper is but fair, and the illustrations to be commended for their scarcity. Helpful illustrations are rarely to be found in cheap books, and the publishers did well not to include many in this series. If these books be used together with a good atlas and such compendia as Stanford's series of volumes on the various countries, they will be very serviceable. Our teachers must, however, not expect to find all that is good in any one series of readers, or text-books. The best geographical library for reference reading should include many readers, each of which could furnish some help.

The series, as a whole, is above the average of geographical readers, and the volumes mentioned are valuable sources of information for collateral reading by pupils, and should be in every school library.

R. E. D.

The Great Round World Reference Atlas. WILLIAM BEVERLY HARRISON, New York.

The author and publisher of the very successful little weekly, The Great Round World, has lately issued a small reference atlas from the press of W. & A. K. Johnston, Edinburg, that is worthy of general use among the young and those who can afford but a cheap atlas. The maps are well selected and well executed, and, though necessarily small, are clear and intelligible. The maps of Europe are especially good, and are perhaps the most useful of the series.

The atlas has few claims for an introduction as a sole reference book in schools, but it has strong claims for general use as a home reference book for pupils and teachers who can afford no very detailed atlas.



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SOME SUGGESTIONS FOR TEACHING THE GEOGRAPHY OF EUROPE.

The following outline for a series of lessons regarding Europe as a whole, and certain countries in detail, is offered here at the request of the *Editor*.

The lessons have been given in the last year of the grammar school, and are for review and comparison. The pupils have previously studied all the continents in an elementary way, and have studied the western continents in detail in the previous year. The plan of the work is to give training in individual study of references, in map interpretation, in studying cause and effect, and in relating as many of the conditions as possible. Particular attention is given to comparing the features and conditions with those in other continents. The physical features are taken as the basis of the work, the pupils having had good previous training in the scientific analysis and classification of land forms, and the relation of man thereto. As will be seen on examination of the details below, the questions and order of procedure are planned to train the pupils to trace the relation of man to his environment in as great minuteness as time will allow.

Any of the better text-books may be used, but the work is here

given in reference to the text-book now used in the grade—Frye's Complete Geography. The map references are to Longmans' New School Atlas, with which every pupil is supplied.

EURASIA.

Surface Features. (Consult Frye, pp. 62-63; 74-75.)

- 1. Locate great highland mass; note arrangement of mountains and plateaus.
- 2. Find similarities in position and character between highlands of Europe and Asia. Contrast with highlands of North America.
- 3. (Consult Frye, sec. 68, 69-77-81.) Find out about the height of the central highlands of Eurasia. What does this fact help you to determine with regard to the climate of the interior basins and the life of the people? Do you find any parallel to this in North America?
- 4. Where are the broad lowlands of Eurasia? Direction of slope. What does this help you to determine about the rivers? Cf. with North America. Which continent has the greater advantage from its arrangement of highland and lowland?
 - 5. What lesser slopes in Europe and Asia?
- 6. Trace line of highland from northeastern part of Asia to southwestern part of Europe. What interruptions appear?

Studies on maps 6, 7, 8. (Consult physical maps of Europe and Asia.)

- 1. On map 6 trace line of northern limit of culture of grains. What does this line tell you of the temperature of Norway and the northern part of Asia as compared to North America?
- 2. Account for the bend downward in this line south of Gulf of Obi—(consult physical map). Cf. with North America. What effect does Hudson Bay have upon this line?
- 3. Trace northern limit of the culture of the grape. Account for its irregularities. What effect do the Great Lakes have upon this line in North America? Why?
- 4. Why can the palm be grown farther north in Europe than in Asia? Map 8, see table of density of population. From the facts of climate which you know and the surface features, account for the density and scarcity of population.

5. Be prepared to give on your outline maps, without reference to atlas, the chief facts relating to the vegetation and population of Eurasia.

EUROPE.

I. Position.

Name advantages of location. Why has Europe led in civilization?

II. Boundaries and Coast Line.

Name surrounding oceans and seas. Trace continental shelf; be able to draw the same on outline maps. What do these shallow border seas tell you of the geologic history of the continent? Name and locate the chief drowned valleys, the largest peninsulas. Which islands belong properly to the mainland? What advantages result to Europe from these deep indentations? Name a continent without them? What effect has this unbroken coast line had upon its development?

III. Physiographic Features. (Consult Physical Map and Key, pp. 74 and 75.)

Get general direction of highland, locate great plateaus. Name chief mountain ranges and enclosed basins. What interruption has the highland mass? Cf. northern and southern slopes. Do highlands form a divide for the rivers of these two slopes? What highlands seem isolated from the main mass? What rivers have their sources in the Alps? What rivers have their sources in central Russia? Name the rivers of the Arctic, Atlantic and Caspian slopes. Compare this drainage system with that of North America. Name advantages of European system. What river of Europe could best be compared with the Mississippi? Why?

CLIMATE OF EUROPE. (See Isothermal Map.)

Conditions resulting from:

- 1. Latitude and Heat-belts.
- 2. Winds.
- 3. Ocean Currents.
- 4. Direction of Mountain Ranges.
- Cf. average temperature of eastern and western portions. Where do we find most violent contrasts in temperature?

Which parts of Europe have a continental, which an oceanic climate? Which parts have an equable climate?

What influence has Mediterranean on climate of southern Europe?

Constantinople is 10° colder than Naples in January. Why? Where would you expect maximum and minimum rainfall. (Consider physical features in your answer.)

Cf. with Southern United States. Account for differences. Number of seasons in Middle Europe, North Europe and South Europe.

FRANCE.

I. Position. (Map 25.)

Latitude—Approximate in North America.

Boundaries—Physical—The French, Spanish and Italians are of the Latin race. Is there any geographical reason why there should be three nations instead of one? What advantages for commerce result from the position of France? Is she as great a maritime power as Great Britain? Reason.

Consult Map 19 and describe the continental shelf. What might we infer of the former extension of this region? Describe the coast line from Cherbourg to the mouth of the Gironde. How can we account for the absence of large towns?

II. Physiographic features.

Highland—Central Plateau.

- 1. Where is the chief divide? Name the different portions. Compare the two slopes; what is the direction of longer?
- 2. Name three master streams. Where are the headwaters of the Allier-Loire?

From a study of the drainage can you find a reason why France has been for so long a united country? Draw a diagram of France showing master streams.

3. What can you say of the short slope? What are the tributaries of Saone-Rhone doing to the edge of this plateau? What effect will this have on the headwaters of the streams of the long slope? Can you find any places where such action might be taking place?

- 4. Trace line of volcanoes (called Puys) in central plateau. Name highest. What streams head on the slopes of these volcanoes?
- 5. The highland of Brittany is the oldland of France. Cf. with oldland in North America.

Lowland—Note number of tributaries which the Seine receives near Paris. Paris basin is an old coastal plain and has been elevated so long that the upper layers have been worn away and the harder rock now appears as hills or ridges. Can you trace them? Why is it that the large rivers pay no attention to them, but appear to cut through them?

Valley of Saone is an old lake bed. (See Frye, p. 77.) Anything to show that it has been recently drained? What contrast between this lake basin and those of Spain? What sort of a valley has the upper Rhone? Describe its course. What is the Rhone building? Where does the waste come from? Why does not the Garonne build a delta? In what two highlands does the Garonne rise? The Lot and the Tarn flow through a limestone region, what features would you expect to find? The Tarn is called "The Colorado of France." What do you infer from this? Note the deposition of waste on northern slope of Pyrenees between Garonne and Adour rivers; what form does it take? See Frye, illustration par. 11, and sec. 84. Best example of a young coastal plain is the Landes. Between what two rivers? Think of land just raised from the sea. Describe it-name a young coastal plain in the United States. Cf. with northwest shore of Adriatic Sea. what geographical feature does France owe her great development? How does this country differ from Spain in this respect? How has man increased this natural facility?

III. Climate.

How do the east and west of France differ in temperature? What direction do the annual isotherms take? Which would have a warmer winter—Brest or Vichy? A warmer summer? Where would you expect to find the heaviest rainfall? What part of France is a health resort in winter? Why?

IV. Products (Frye, pp. 164, 165). For what occupations are the lowlands fitted? the highlands? What was the occupation of the first Frenchmen who came to North America? From what part of France did they come?

Vegetable—Contrast northern and southern parts, eastern and western.

Mineral—St. Etienne is center of coal district, there is also another district near Belgium.

Iron near St. Etienne—What can you say concerning amount and distribution of mining products? What is obtained from Vichy?

- V. Manufactures and Commerce (Frye, pp. 164, 165). Make list. In what does France surpass every other country? From what countries does she import wool? Locate the large manufacturing towns and name chief article of export. With what country does France naturally carry on a large trade? What facilities has she for home trade?
- VI. Towns-Name chief coast towns.

What are the advantages of the location of Paris?

Name other cities with similar advantages.

Give reasons for location and importance of following towns: Lyons, Toulouse, Chalons-sur-Marne, St. Etienne, Dijon, Bordeaux, Havre.

Nantes used to be an important seaport, but is now superseded by St. Nazaire. Can you give any reason for this? Recall Pisa and Leghorn.

What are the chief foreign possessions of France?

When did France cease to hold any territory in North America?

SPAIN AND PORTUGAL.

I. Position. (Map 29.)

Approximate latitude in North America. Find four large cities in the same latitude as Madrid.

II. Surface features. (Frye's map in appendix.)

Cf. with Africa as to highland and lowland. Draw a cross-section of the peninsula along parallel of 40 degrees.

What is the average height of the plateau?

Name and locate chief mountain ranges. What river basins do they separate?

Are the Pyrenees easily crossed? Examine railroads between France and Spain for your answer.

In what part of the peninsula lies the divide between east and west slopes? Cf. these slopes as to length.

The basins of the Elro, Douro, and Tagus are old lake basins now drained and filled with waste. Examine the outlets of these basins; what should we find in the rivers at these points?

The Guadalquivir is not a lake plain; how might we infer this fact from the map?

Examine coast line; what do you find in the northwest similar to Greece and Norway?

Where do you find coastal plains? What are the streams on east coast building? Why do you find an absence of these features on west coast?

III. Climate.

From what you know of the winds, ocean currents, physical features and surrounding seas and land, describe the climate of the plateau and coast portions as to temperature, rainfall, and the consequent effect of these on rivers, vegetation and the distribution of population.

IV. Resources and Industries.

Why is the olive so well fitted to grow on the plateau?

What are the chief agricultural products?

In north and south are rich mineral deposits. In the north, coal in Asturias, iron in Basque Provinces.

In the south, quicksilver at Almaden, copper at Rio Tinto, and lead at Linares.

What are the chief industries and exports?

What artificial aid must be used to carry on agricultural pursuits?

V. Towns.

Name some of the important political divisions of Spain.

Can you find any geographical reasons why there should have been formerly so many separate states?

Give reason for the location of Seville, Huelva, Oviedo, Barcelona, Cartagena, Oporto.

Why should Madrid be located on the dry plateau?

Of what historical importance are Palos, Castile, Aragon, Granada, Navarre?

When was Spain at the height of her power? Who supplanted her? How does she rank now among the European Powers?

ITALY.

I. Position. (Map 30.)

Approximate latitude of Rome, Naples, Venice in North America. Extent of Italy in latitude degrees.

Boundaries. Locate the Pennine, Lepontine and Rhoetian Alps, Dolomites, Carnian and Maritime Alps. What are the three natural divisions of Italy? What are the commercial advantages and disadvantages of position? How have the latter been largely overcome?

II. Coast-line. (Map 19.)

Cf. east and west coasts as regards continental shelf. What island south of Sicily should belong to Italy? To whom does it belong? What separates the continent of Africa from Italy? Account for the few ports on the east coast. Study coast line of northwest part of the Adriatic. Compare with North America. Draw this coast, also that portion of North America used as a comparison. What proofs can you find that the land is encroaching on the sea?

III. Surface features:

1. The plain of the Po. (Frye, sec. 79.)

What indication do you find on the map that the plain is not much above sea-level (see legend, map 30). Of what is the plain made? What relation is there between the surface of the river and the plain? What problem does this relation present to the people living on the plain? How have they met it? Cf. with the Mississippi.

From what slopes does the Po receive tributaries? Which is the longer? What characteristic do you notice of the rivers from the north? What are you told of the formation of Lakes Como, Maggiore and Garda?

2. The peninsula and islands.

Where do the Apennines begin, where do they end? Look up derivation of Apennine in Century dictionary. Cf. the eastern and western slopes. Note the alluvial valleys in the Apennines,

how have they been used by man. Where is the volcanic region? Lakes Bolsena and Bracciano occupy craters of extinct volcanoes. What is the only active volcano in Europe? What extinct volcano in Sicily? What evidences of the interior heat of the earth can you mention besides volcanoes? Which of these evidences can be found in Italy? Cf. Mt. Etna and Mt. Vesuvius in height with mountain peaks in eastern North America.

What is the chief characteristic of the eastern coast between Naples and Pisa? Where are the lowlands of Sicily and Sardinia?

IV. Climate and products.

Why is it necessary to have irrigating canals in the plain of the Po? Which part of Italy would receive more rain in the summer? Which would have greater extremes of climate? Trace isothermal line of 40° and compare winter temperature of London and Turin. The winter temperature of Florence is 5° higher than of Bologna; why? Account for the warmer, more equable climate of the Riviera.

What differences in the products of continental and peninsular Italy? Name chief products. Where is the finest marble quarried? Where would sulphur be mined? What are the chief industries of Italy?

Locate chief cities of Italy and account for location of each. Classify cities on the basis of reasons for location. Good Harbors: Genoa, Leghorn, Naples, Otranto. Head of Navigation: Florence, Rome, Turin. Need for Defence: Venice, San Marino, Monaco, (Fr. & I.). Guarding Mountain Passes, Intersection of Roads over Mountains: Milan, Turin, Genoa, Bologna, Florence, Verona. Cities whose Importance has declined from Silting up of Harbors: Pisa, Venice (growing), Ravenna.

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A DAY IN THE FALKLAND ISLANDS.

Exposed to the unbroken sweep of the stormy westerly winds of the South Atlantic Ocean, with rain falling on more than twothirds of all the days in the year, and with climatic conditions so unfavorable to agriculture that practically nothing can be cultivated, the Falkland Islands would seem at first thought to be singularly unfitted for human habitation, and likely to be willingly abandoned by man to the myriads of sea fowl and great flocks of penguins that frequent those rocky shores. Yet here, on these distant islands, there has for years lived a happy and prosperous community, and many a good ship which has been worsted in the struggle to round Cape Horn in the teeth of the westerly gales, has found Stanley Harbor a welcome haven, and hundreds of sailors have there been provided with the food and the water they so often sorely needed.

The Falkland group consists of two larger islands, East and West Falkland, and a considerable number of much smaller ones, only a few of which are inhabited, besides a great confusion of surrounding rocks and reefs. East Falkland, the larger of the two main islands, has an area of about 3,000 square miles, and West Falkland embraces about 2,000 square miles. The group lies roughly between latitude 51° and 53° S.; longitude 57° and 62° W., and is about 250 miles in a direct line east of the eastern entrance to the Strait of Magellan. The Falklands have had a checkered history, but after many vicissitudes as possessions of Great Britain, Spain and France, they have, since 1833, been an English colony, ruled by a governor appointed by the Crown. They are also the see of a colonial bishopric.

It was the writer's good fortune, on a recent voyage from Montevideo to the west coast of South America, to take passage on a steamer which called at the Falkland Islands on her way to Valparaiso. Regular steam communication between the Falklands and the mainland is kept up by the German steamship company "Kosmos," which has, for some years, held the contract for carrying the mails to and from the islands. One steamer a month calls at Port Stanley on her outward voyage from England, and one steamer a month calls there on her homeward voyage to England from the west coast of South America. It was on one of these "Kosmos" steamers that the writer sailed from Montevideo on July 25th, last.

The first day of the voyage furnished as fine an example as could be desired of typical "Horse Latitude" weather. The

barometer stood very high; the sky was clear; the wind was lightfrom the north, and the air dry and exhilarating. On the second day the pressure fell slowly and steadily as more southern latitudes were reached; the wind showed the effect of the increased gradient and became stronger, while its direction from west northwest was an indication of an approach to the regions of the prevailing westerlies of the Southern Hemisphere. The weather continued fair, but with an increase of cloudiness in the afternoon which foreboded stormy weather for the next day. The third day of the voyage began with a clear sky and light west-northwest wind, but during the morning and afternoon rapidly increasing cloudiness and a higher velocity of wind, were unfailing signs that the ship was leaving the fair-weather latitudes and penetrating further into those where stormy weather is the rule and bright days are the exception. On July 29th, the fourth day out from Montevideo, the sky was overcast and the wind southeast, while the temperature fell steadily. On the morning of this day the Falkland Islands were sighted and for two hours the steamer sailed along quite near the shore. The general appearance of the Islands, as seen from the sea, is wild and desolate. A rugged coast with the sea breaking against the cliffs and rushing wildly among the outlying rocky islets; inland some yellowish-brown fields, rising towards uplands broken here and there by whitish masses of quartzite; the whole outlined against a gray, confused sky-that was the picture which presented itself to the eye.

Port Stanley, the seat of government and the principal settlement on the Islands, is situated at the northeastern extremity of East Falkland. It has an inner landlocked harbor, five miles long and from one-half to three-quarters of a mile wide, running east and west. The entrance to this is about three hundred yards wide and these narrows form the outer harbor. After steaming slowly through the outer harbor and the narrow channel into the inner harbor, the steamer anchored off Port Stanley early in the afternoon. The bottom of the little bay is of soft mud, a rather unexpected feature in the midst of the surrounding rocks. The shipping at anchor was at once an interesting and a pathetic sight. There were two sailing vessels—a German barque and an Italian ship—in good order and ready to sail, but the remaining ones told a

silent story of fierce struggles with sea and storm. Several old hulks were lying there, long ago abandoned to their fate. One English barque, which was anchored near-by, particularly attracted the writer's attention. She had been considerably damaged, probably in attempting to round the Horn and had put into Stanley Harbor for repairs. Carpenters and riggers were all over her, putting her into condition for another voyage. Four weeks later he read, in a Valparaiso paper, that this very barque had been lost, with all on board, off Cape Horn. Certainly one glance at the shipping in Stanley Harbor gave a very practical illustration of the strength of the stormy westerlies of the Southern Hemisphere.

The town of Port Stanley lies on the southern shore of the bay, on a long slope, and is thus partially sheltered from the violent southerly winds. It has at present about one thousand inhabitants, nearly all being English or Scotch. There are three schools, three churches, several inns, a postoffice, the Government House, and a few other public buildings. The houses are low-storied; built of wood or stone, and painted white, with colored roofs. The islanders do their best to counteract the prevailing dull and depressing weather conditions out of doors by providing an abundance of color and of beauty indoors, and there is scarcely a window in any house in Port Stanley which is not filled with many varieties of potted plants, whose flowers go far towards providing the brightness and the cheer which the dull skies do not furnish.

The early days of the settlement of India and of the "Honorable East India Company," are recalled to the visitor to Port Stanley when he reads, in large letters on one of the principal buildings, "The Falkland Islands Company." This company, like its East India predecessor, was incorporated by royal charter, the date of its charter being 1851. It had previously acquired by purchase, the rights to a large tract of country on East Falkland, and it now plays an important part in the life of the colony. It owns several sheep-stations in different parts of the Islands, and extensive works for boiling down tallow. Its steamer, which comes out once a year from England with all kinds of stores, carries on the greater part of the coasting trade between the various settlements. The company also has quite an extensive plant for repair-

ing the disabled vessels which put into Port Stanley, and the "Company's Stores" at Port Stanley is an indispensable institution for the inhabitants. In Stanley Harbor the Company also has a great hulk, formerly the famous ship "Great Britain," which is used as a receiving ship for the wool brought from the smaller ports for shipment in the "Kosmos" steamers to England. This ship was 320 feet long, and in her day carried many passengers from England to the Colonies.

The one fact which is impressed upon the visitor to the Falklands during every moment of his stay is the stormy character of the climate. Situated, as they are, far out in the ocean, they are exposed to the unbroken sweep of the stormy westerly winds, and Fitzroy was not far wrong when he said, "A region more exposed to storm, both in summer and winter, it would be difficult to mention." An old resident of Port Stanley told the writer that when the sun shines for an hour, every one says, "What a fine day we are having," and although this statement is considerably exaggerated, the story serves to emphasize the fact that clouds and not sunshine are the prevailing conditions. Here, in the heart of the westerlies, the cyclonic control of weather is predominant, and as one cyclone follows another in quick succession, "settled weather" is out of the question. The climate of the Falklands is a good sample of the conditions prevailing throughout the broad expanse of southern oceans swept over by the stormy westerlies. Their winters can never be very cold, nor can their summers ever be hot; the mean annual temperature is about 43°; the January mean 50°, and the July mean 37°. The mean maximum for the year is about 70°; the mean minimum 22°. The mean monthly minima falls below freezing in every month except January to April. The relative humidity varies between 72 % (January), and 91 % (June and July). The mean cloudiness is 71 %. The prevailing winds are westerly and southwesterly. Reference has already been made to the fact that rain falls on more than two-thirds of the days of the year, but, in spite of this fact, the mean annual rainfall is but slightly over 20 inches. This is because heavy showers are almost unknown, the precipitation coming as a mist, damp fog or drizzle. The violence of the winds in the Falklands is an inevitable consequence of their exposed position, and constitutes a very disagreeable feature of their climate. It is characteristic of the summers of the prevailing westerlies of the Southern Hemisphere that snow may fall even in midsummer, and this is true of the Falklands. A southerly wind, even in January or February, is not infrequently accompanied by snow or hail. The writer was at Port Stanley on July 30 and 31 last, and the meteorological conditions of those two days furnished a very good example of "Falkland Islands weather." On the first the sky was overcast, and a west-northwest gale blew all day, with occasional showers. The temperatures varied between 41° and 44°. July 31 began with a southwest wind and frequent snow squalls, but later the wind changed to southwest and the sky partially cleared, there being occasionally brief glimpses of sunshine. The temperature was about 38° all day.

In the climatic conditions of the Falklands we have the key to the occupations of the inhabitants, and to the imports and exports of the colony. There are no trees anywhere on the Islands, and their absence is one of the first things that strikes a visitor. Undoubtedly, the high winds are one of the chief causes, if not the chief cause, in preventing tree growth, and, although many attempts have been made to cultivate trees, by transplanting them from the mainland, they have failed. In the absence of wood, peat, which is very abundant on the Islands, is universally used for fuel, and all the lumber used in house or ship building, or for any other purpose, has to be imported. The very small amount of sunshine, the cold, the high winds, and the prevailing dull, damp weather, make agriculture of any kind practically impossible. In fact, it may almost be said that agriculture does not exist in the Falklands. A few vegetables only are grown, and these are of a very poor quality. Domestic cattle are kept and meat is cheap, but with the one exception of beef and mutton and of the few native-grown vegetables and berries, practically everything in the way of food has to be imported. Through the hospitality of the United States Consul at Port Stanley, the writer had the pleasure of a dinner at the Consulate during the steamer's stay in Stanley Harbor. The dinner, which would have been a credit to any housekeeper in America, consisted of seven courses, and every single article of food that came on to the table, with the exception of the roast beef and the milk, had been imported. Certainly, no better illustrations could

be given of the way in which climatic conditions, by preventing the growth of vegetable food in the Islands, control the importation of food stuffs.

But the very same conditions which are unfavorable to the growth of crops, seem to be peculiarly fitted for sheep farming, and this is now and has been for years, the great industry of the Islands. The sheep originally introduced were largely Cheviots and South Downs, and the descendants of this stock are famous for their heavy fleece, their hardihood and the excellence of their meat. Falklands have been peculiarly free from all sheep diseases, and, in spite of the apparently unfavorable climatic conditions, the sheep thrive there in a truly remarkable way. In the earlier days of the colony there was considerable exportation of sealskins and penguin feathers, and later, of whale and seal oil, but now the wool and the tallow from the sheep carcasses form almost the sole articles of export. The success which attended the exportation of frozen mutton from Australia and New Zealand, induced the Falkland Islanders to try the same experiment with their mutton a few years ago, but wool still remains the staple product.

There is little of interest in the fauna and flora of the Islands. Seals and penguins are still quite plentiful, although their former wholesale destruction made it necessary to protect them by law. Rabbits, once very numerous, are now found on only two of the islands. The wild cattle, also, which in the early days of the colony abounded everywhere, are now extinct. Fish are abundant in the waters surrounding the Islands, but the task of catching them is so very difficult, on account of the frequent storms and rough water, that they are seldom used for food. Albatrosses, cormorants and other sea birds make their nests on the rocky shores. has already been referred to as being abundant. A reed-like grass ("tussock grass"), which grows in thick bunches and is much sought after by sheep and cattle, is still conspicuous along the shores, but is rapidly disappearing. Several varieties of berries, moss, lichen, rushes, etc., are also found. In the water along the coast are great quantities of kelp, which, growing always on a rocky bottom, is regarded by seamen as an infallible sign of the presence of rocks, although the latter may be many fathoms deep. This kelp, which is found in immense quantities around the Falklands, constitutes, in some places, a natural breakwater, diminishing very materially the energy of the incoming waves. So distinctive of these Islands is this gigantic seaweed that the inhabitants are generally known as "kelpers."

At the present time there are practically no commercial relations of any kind between the Falkland Islands and the United States. In the days gone by, when American shipping was in its prime, Port Stanley was often visited by vessels flying the Stars and Stripes. They came, with those of the other maritime nations, to get food and water, to seek needed repairs, or to land some disabled seaman, to be sent back to his own country at the expense of his government. But, now, that the American merchant marine has practically disappeared from foreign waters, the American flag is hardly ever seen in Stanley harbor. Only at long intervals does an American—an occasional traveler like the writer, whom chance brings there—visit the Falklands.

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SOME SUGGESTIONS FOR TEACHING ELEMENTARY METEOROLOGY.

(Continued from page 9.)

The study of isotherms outlined in the preceding paper should not be made too hastily. It should be sufficiently thorough to equip the pupils, not merely with a word which may be glibly repeated, but also, with the ability to draw isothermal lines rapidly from given data, and to interpret clearly the chart thus made. New problems should be attacked just as rapidly as the pupils are ready to lead the way, but no faster. These exercises—and any which follow—will be of value only as they are worked out by the pupils independently. The teacher's main function is to prevent too hasty conclusions, and to keep the class always advancing in the right direction.

When the class is ready for a new exercise, the distribution of atmospheric pressure may be studied. The mode of procedure here

should be similar to that followed with the thermometer readings. Select a map showing typical and not too complicated conditions, and have the pupils enter the readings of air pressure given in the table on a blank map; then require oral statements of where the pressure is greatest, where least, the change in pressure which would occur on travelling in any specified direction, etc. In this way, a general idea of the arrangement of pressure will be acquired. Next, have a line drawn, separating the areas where the pressure is less than thirty inches of mercury from those where the pressure is more than thirty. Few readings of exactly 30.0 will be found, and guiding points, showing just where the line is to run, should first be located by inspecting the figures on either side. Thus a 30.0 line would run midway between 29.98 and 30.02, and twice as far from 29.92 as from 30.04. All changes in direction should be made with rounded curves instead of sharp angles.

In the same manner, other lines should be drawn for each change of one tenth of an inch in pressure, until the whole map has been divided into narrow areas. When the nature of these lines has been learned, their name, "isobars" or equal pressure lines, may be given to the class. The irregular loops which they form, and their imperfectly concentric arrangement about areas of highest or lowest pressure will attract attention. These enclosed areas may now be marked "high" or "low" according to the pressure indicated.

It will be well at this point, to give a brief explanation of the fact that this distribution of pressure is due to atmospheric changes alone and not to altitude; for, while it is scarcely practicable to attempt any correction of barometric readings with grammar school pupils, it is not difficult to lead them to see that such corrections have been applied to the weather map readings, and to understand the reasons for so doing. The foundation for such an explanation should be laid when the daily observations with the barometer are begun. In explaining the principle and use of that instrument, begin with those effects of atmospheric pressure already familiar, though perhaps unexplained: with such simple phenomena as water held in an inverted jar having a card over the mouth, the rising of water in a boy's toy syringe when the piston is drawn back, water held in a tube when the thumb is placed over

one end and its fall when the thumb is removed, etc. Above all, emphasize the existence of atmospheric pressure as a necessary result of the fact that air has weight. Anything which tends to decrease the amount or density of the air resting on a surface lowers the weight, and therefore the pressure, over that If this rational beginning be made at that time, the surface. pupils will be ready, when they have completed the study of isobars, to suggest that when one station is higher than another, its pressure will naturally be less by just the weight of the column of air between the two, and that if we wish to compare the readings of atmospheric pressure for several stations, and to learn from such comparison anything regarding the condition of the atmosphere itself, we must correct all barometric readings by reducing them to a constant temperature, and by adding to each reading the weight of an imaginary column of air extending from the station, downward to a fixed plane. For this reason, all barometric readings shown on the weather maps represent the height of the column of mercury which would exist at 32° F. and sea level. If the home locality is a Weather Bureau station, the teacher may correct the local readings so that they may be compared with those given on the maps.

On a third blank map, the pupils should be required to represent, by means of arrows, the direction and velocity of the winds as they existed at the various Weather Bureau stations on some selected date. (The teacher will find the wind velocities for this exercise given in the table appended to the weather map; the wind directions may be found from the position of the arrows at the various stations.) These arrows should fly with the wind, and they should be longer and heavier where the winds are stronger. Thus: calm \odot ; light wind (0 to 3 miles per hour) \longrightarrow ; 3 to 5 miles per hour \longrightarrow ; 5 to 10 miles per hour \longrightarrow ; 10 to 15 \longrightarrow ; etc.

Having mastered the general features of the three elements of temperature, pressure, and wind, the pupils should be given practice in constructing complete maps from new data. To distinguish the lines on these, the isotherms may be drawn in red.

In addition to such practice in constructing weather maps, an opportunity should be given for examining a number of the regu-

lar maps. In this way, the great variation in temperature, winds, and the position of the areas of high and low pressure will be made obvious. All conventional signs employed in constructing the maps should be learned. The shaded areas (rain), in particular, should receive attention, and the comparatively local nature of storms should be made clear. This line of study will give opportunity for a large amount of practice in oral description and the teacher will do well to make full use of it. Questions of great variety may be put to the class, the answers to which are to be found from an examination of the maps. If a sufficient number of maps be examined, little difficulty will be experienced in guiding the pupils to a discovery of such important facts as that the isobaric loops usually have their long diameter northeast and southwest, that the isotherms bend southward at the "low," and that the storm area is, as a rule, located near a "low."

It will greatly add to the interest also, if the teacher will give one or two short talks upon the organization of the National Weather Service, the time and manner of making observations, the cipher used in transmitting readings to the central office, and the plan followed at Washington, in making up the daily maps, and distributing the daily weather torecasts.

This, the point at which weather map study usually stops, is far from all that may be done with grammar school classes. Some of the most important facts of meteorology may be established by intensive study, not in itself difficult. Have lines drawn on the complete maps made, extending from a "high" to the nearest "low," and crossing all isobars at right angles. It is along these lines, manifestly, that the most rapid increase or decrease of pressure occurs. They will diverge from the "high" and converge toward the "low." By measuring the segment of one of these lines included between two isobars, and reducing it to miles according to the scale of the map, a numerical expression for the rate of change in pressure may be obtained. Thus, since the changes in pressure between two isobars is one-tenth of an inch of the mercury column, if the length of the segment represent two hundred miles, the rate would be one-tenth of an inch for two hundred miles or one two-thousandth of an inch per mile. This numerical expression of rate is known as the "barometric gradi

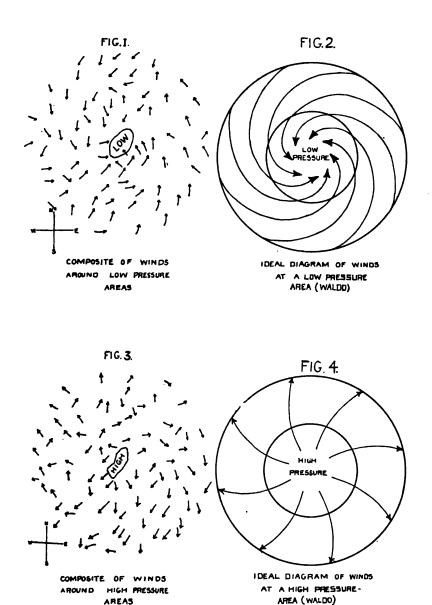
ent." When the pupils have computed a number of gradients, the wind velocities at those stations nearest the gradients should be compared with them. The correlation of the two—greatest wind velocity with the highest value of the gradient—will be very clearly shown. The regions of strong winds, therefore, may be found by merely noticing where the isobars are closest together.

This line of study should be continued until the pupil has discovered that relatively low values of the gradients and light winds are characteristic of high pressure areas, and relatively high gradients and strong winds of low pressure areas.

The arrows showing wind directions on weather maps are somewhat widely separated and additional arrows should be inserted between them. The direction of such additional arrows must, of course, be inferred, but if the position of the others be carefully observed, no large errors should be made. In this way, the existence of great currents of air sweeping over the country will be established. The general direction of motion for these, from an area of high pressure toward an area of low pressure, will be clearly apparent on examination. That this motion is not exactly along the lines of most rapid change in pressure, as might be expected, may be found by comparing the position of the wind arrows with the lines. The arrows will be found to cross the lines toward the right in a majority of cases. The significance of this will appear later.

The above exercises (if they are to be successful) will take time, and the writer would reiterate his previous warning to proceed slowly. They are not difficult, however, and the patient, tactful teacher will be rewarded by finding that his pupils have worked their way, understandingly, and by their own efforts, to the great cause out of which grow all our common weather phenomena; the fact that the winds flow in great currents outward from areas of high pressure and inward from all sides toward areas of low pressure, turning to the right as they go.

A more complete understanding of the subject requires a detailed examination into the phenomena exhibited at the areas of high and low pressure. The nature of the winds should be considered first. For this, tracing paper cut into six inch squares will be needed. At the centre of the square, a cross should be marked to serve as



a point of reference; and it is well, also, to draw a line across the square which may be taken as a north and south line. The paper thus prepared should be placed over a weather map, with the cross as nearly as possible over the centre of the low pressure area, as roughly outlined by the isobars around it, and with the north and south line due north and south on the map, and all winds arrows for a radius of three or four inches about the centre should be marked upon it. By transferring the same paper to a similar position over a second low pressure area and proceeding as before, and so on for several "lows," a composite of the winds around such areas will be obtained. (Fig. 1.) This, upon examination, will clearly show a more or less systematic arrangement of the winds in a great inward moving spiral turning contrary to the hands of a clock. (Fig. 2.) To give the pupils a clear conception of such an eddy, they should be asked to observe that which occurs in a water basin when, the basin being filled, the plug is suddenly removed. The ideal drawing of Fig. 2 may also be placed upon the board.

Tracings obtained in a similar manner of the winds about a number of high pressure areas will furnish a composite (Fig. 3) which, on inspection, will reveal an outward moving spiral turning with the hands of a watch. (Fig. 4.)

(To be continued.)

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THE ATLANTIC COAST AND ITS LIGHTHOUSES.

The quality of an ocean shore and its relation to man commercially and economically, is shown very clearly by the arrangement and character of the lights and signals that invite the mariner in or caution him to keep away according as the shore is provided with harbors or not. From the earliest times, beacons, temporary and permanent, have been used to tell the sailor of his position and to guide him to land. The earliest lighthouse known was at Alexandria, Egypt, in 300 B. C., and many more were built in the times of the Romans.

The first lighthouse in the United States was built in 1716, on Little Brewster Island, Boston Harbor, at the entrance to that important haven, soon followed by a second at Nantucket, the great whaling and fishing centre. In 1789, the newly formed government found eight lighthouses established, which were continued under government control. Since that time the number has been greatly increased, until now all the important points on the seashore, navigable rivers and lakes are indicated by beacons, capable of signaling to the distant seaman his geographic position without a chance of mistake.

The Atlantic coast of the United States may be roughly divided into two parts, that to the north of New York, rock bound and rugged, having many harbors large and small, that are havens of refuge for coasters; and that to the south of New York, where great uninterrupted stretches of sandy, changing beach or cliff-shore offer few chances for the mariner to secure shelter except where the larger rivers come to the sea. Hence the southern shore is inhospitable and must be guarded with lighthouses capable of being seen at a great distance—lights of warning 1 ather than invitation. Except in the larger estuaries, this southern shore has few lights for the guiding to smaller ports.

When a sailor approaches land he is naturally, because of the irregularity of the shore, nearer to certain points than to others. For instance, the sailor approaching Boston Harbor, in Massachusetts, at the inner reentrant of the bow from Cape Ann to Cape Cod would find one of these two promontories before he would see his actual harbor. Hence, on these capes there should be lights of great magnitude to guide the incomer, and to warn the coaster to keep off shore. On Cape Ann are two lighthouses, side by side, capable of being seen 19 miles to sea. The lights are shown from towers over 160 feet high, and fitted with lenses so large that people can enter between the light and the lenses that focus the rays before they are shot seaward. Near the northern end of Cape Cod is another first order light, 183 feet above mean sea level, and capable of being seen 194 miles. These lights can readily be told by the character of the flashes from any other of the largest lights along the shore, and hence tell the sailor of his approximate position, and are known as Land Fall Lights. In the language of a map maker, they are his primary points, which may be used as guides for the location of less accessible places embraced within these points. The map-maker first finds the exact position (that is, latitude and longitude) of the highest points in the area he is to map. On each he erects a signal capable of being seen at great distances. Once these primary points are located, he can determine the position of less conspicuous hills or secondary points with ease. Naturally, the secondary points would be more numerous than the primary. From the secondary hills it is usually possible for the surveyor to locate every cross road, house, stream and indeed every feature, so that he can be sure his map is an accurate plan of the actual features.

In the same way the mariner entering Boston Bay, warned and guided by the more prominent lights mentioned, proceeds with cantion and looks for his range lights, that is, the lights that guide him to the very spot he aims to reach. In the case in mind the mariner would soon see the light at Plymouth, if entering from the south, which would guide him to the marvelous Minot's Ledge light, built on a very exposed ledge, some distance from shore, off Cohasset and in one of the most dangerous situations along the shore, and then to Boston Light, at the entrance to Boston Harbor. Once having passed Boston Light, with a pilot on board, he would be guided by the smaller, less penetrating range or shore lights that give exact directions as to how to follow the tortuous and narrow channels and how to reach the wharf desired. Between Boston Light and the city of Boston there are three smaller lights and several beacons, buoys, with and without bells, etc.

This illustration may be applied to all the ports of entry along any shore. Every mariner has a copy of the list of lighthouses and fog signals issued by the Government, showing all that is necessary to determine any light by day as well as by night, also the coast charts and all helps that can be given him.

Not every point that needs to be indicated by beacon can, however, be noted by a fixed lighthouse, no matter how skillful the engineer. Hence the Light House Service of the United States includes light-ships as well as lighthouses, etc. A light-ship is anchored over all the important shoals along the coast and at good points of departure for entrances to harbors where no lighthouse

is possible. For instance, Sandy Hook light-ship marks the entrance to New York Harbor. Light-vessels are set with lights for night use fixed on masts, and basket cages for day use. The lightvessel is fastened to the ocean bottom by anchors attached to the bottom of the keel and cannot be moved except in the most violent storms, when they occasionally break away and are temporarily They are, however, now rigged with steam or sails, whereby, if sent adrift, they can be steered to port. The most exposed and desolate of all the light-vessels on the Atlantic shore is the Nantucket New South Shoal Light-ship, far out to sea, southeast of the Island of Nantucket. This vessel is far out of sight of land and serves as a guide to European vessels making New York The amount of shipping passing it is not great, the position is very exposed and the life of the sailors, who are on the vessel months without any word from land, is desolate almost to the verge of madness.

Taken as a whole, the lights employed may be grouped in six classes, according to the candle power. The first order lights used for all the more important positions have 450 candle power. The lesser lights for more special positions are of 163 candle power; the fourth, fifth and sixth order lights are of 32, 18 and 12.54 candle power, respectively. Besides these lights used for interior and harbor lights, there are occasionally used for special small channels lights of the order of a railway headlight. They are, of course, not capable of being seen at great distances.

Along the southern shore of the Atlantic Seaboard, we find the lights infrequent and largely restricted to the greater capes and other special points. All of the estuaries, like Delaware and Chesapeake Bays, caused by the recent sinking or drowning of the Atlantic coastal plain, are the seat of many smaller range and shore lights. The soft rocks of the coastal plain, which give way easily to the repeated assaults of the sea, have formed a shore faced by a series of long uninterrupted sandy beaches, with interior lagoons. Hence the shore is bleak, comparatively free from harbors of refuge, and thus the lights are mostly lights of warning. The more northern shore of the rocky New England coast, with its deep fjords, presents a different aspect, because the rocks of varying hardness are formed into promontories and bays by the ocean. As

a result, there are many accessible havens of safety and the character of the lights is different from the lights of the southern shore. Where the rocks are hard and ancient and there is no coastal plain, there are many harbors; where the shore is formed along the coastal plain, there are few interruptions to the almost continuous beaches, and the lights are thus few but powerful. Between the extremity of Cape Cod and the eastern end of Long Island, is a great sandy area where there are many shoals and bars. Hence the greater number of light-vessels and lighthouses in this region.

Thus the recent history of the Atlantic Seaboard has determined its character in a physical way; its character has determined its relation to seafaring men; and its use or disuse has determined the character of the lighthouse to be built and the number of life saving stations. The shoals are the seat of fisheries, and hence the occupations of towns like Provincetown and Gloucester, Mass., are determined by the physical features. Over the now forming land, the light-vessels find a rough sea and a hard place for anchorage, and yet they are necessary there because of the fishermen, as well as the coasting vessels.

A similar account of the relations of man to the water might be given for our greater rivers and lakes, but the system of lights is the same throughout our country, and the knowledge of the reason for lights in one area will give a due understanding of all.

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NOTES.

Philippine Islands.—The present revolt in the Philippine Islands has drawn attention to this group, which previously has not received due consideration, owing to the proportion of its white inhabitants being very small, and its position out of the usual channels of human intercourse.

Physical Features.—The archipelago consists of some nineteen hundred islands, of which the largest are Luzon, containing 40,000 square miles, and Mindanao, containing 30,000 square miles. The others, with the exception of three or four, are small. They are situated northeast of the unhealthy tropical regions of Borneo

and Sumatra, and enjoy a most delightful climate. There is a marked alternation of monsoons, which afford pleasing changes between wet and dry seasons, but not striking contrasts in temperature. The shores of the islands are deeply indented, and their surfaces covered with a dense growth of tropical vegetation.

The mountains of the island are parts of the chain which extends from Borneo to Japan. They are mostly of volcanic origin. Indeed, the entire group is the centre of the greatest subterranean activity on the globe. The earthquakes are so frequent that the islands are practically never at rest. The shocks are so frequent and severe that great damage is done. Manilla has been destroyed twice, and all buildings are constructed to afford the greatest resistance to the movements of the earth. Within recent years islands have risen bodily out of the ocean, and others have disappeared.

Both extinct and active volcanoes are numerous. The highest mountain peak, Mayon, is of volcanic origin. It is a stately cone, 9,000 feet high, and its base covers eighty square miles of territory. It emits vast quantities of ashes, but little lava. The crater of Taal is a wonder of nature. It rises in the centre of Lake Bombon, which is eighty miles across. The crater is very active, and within it are found two lakelets, one charged with sulphuric and the other with hydrochloric acid in the proportion of over six per cent. The shores of Lake Bombon itself give evidence of having once been the rim of an immense volcano. The water of the lake is slightly saline, as though it has been raised from the sea. The fish in it are of marine origin, and have gradually adapted themselves to the slowly changing conditions which surround them.

On the shores of the island are found coral limestones, which indicate that the ground has risen within recent geological times. At other places the shores are sinking.

The sea and rivers teem with aquatic life. The forests are filled with birds of beautiful plumage and sweet song. Snakes, alligators and other reptile life is abundant, but beasts of prey are unknown.

Inhabitants.—The Philippines support a population of between seven and nine millions. Luzon has twice as many inhabitants as Cuba.

The original inhabitants are a branch of the negro race, and belong to a very low order of humanity. The average height is under five feet; the head is comparatively large, and the arms and legs slender. Their life is very savage. Occasionally they build huts of branches and leaves, but more frequently their only protection from the sun, wind and rain is a screen of palm leaves. At present they number about 20,000, most of whom live in the interior of the islands. The rest have been exterminated by the conquering stronger nations, or have merged into them.

Centuries ago the Malays of the neighboring islands began their conquest. They now form the chief part, in numbers, of the population. Besides these are a large number of Chinese, about 14,000 Europeans, and several thousand half castes. The Chinese occupation was bitterly opposed at one time by the Europeans and Malays, and they were driven from the islands, but with them went industrial and commercial prosperity, and it was necessary to recall them. The Malays are indolent people, content with sufficient to eat and a small surplus with which to gamble. Nature affords this with but little labor. Each family on the islands has its allotment of land, which supports it nicely. With the exception of the Chinese half-castes, no one owns extensive domains.

Three religions predominate in the islands: Catholic, Moor and infidel, or the early heathen. Of these the Catholic holds practical sway. Its followers number 4,500,000, and are the most civilized part of the community. The bishops and chief functionaries are Spaniards. The rest of the priests are halfcastes or Malays. Their authority extends not only to religious matters, but they do most of the ruling in civil affairs. have established schools throughout the islands, where the youths are taught to read and write Spanish, most of which is forgotten soon after school days are over. Spanish, however, is the language of the better classes, and is gradually coming into general use. Secondary education is given at one or two places, and a college has been established at Santo Tomas for many years, but foreign scientific and literary works are excluded; even the newspapers are subjected to ecclesiastical censure. No form of public worship is tolerated excepted that of Catholicism.

Centuries ago the Moors, from India, conquered the southern

part of the archipelago, and established their religion. They developed into a pirate class, which, until very recently, was the terror of the region. Numberless marauding expeditions kept their tables supplied with food, and their harems with women. Their faith, here, as elsewhere, inspired them to deeds of valor and fiendishness "for the love of Allah."

The followers of the native religions are called infidels. A few of their temples are to be found in the interior of the islands, but they are rapidly becoming less. The worshippers do not form a large part of the population.

The islands should be considered a military possession of Spain rather than a colony. The few white people are all connected with the administration or the church. The government is conducted directly from Madrid. The Governor-General is the chief administrative officer, and has almost absolute power, being responsible only to the home government. His domains are divided into three provinces, ruled by assistants. These are again subdivided into districts, and the districts into parishes. The revenues are devoted to the maintenance of Spain's diplomatic relations with eastern nations.

Products.—The Philippine Islands are said, on good authority, to be the richest archipelago in the world. Since their discovery by Magellan and subsequent occupation by the Spanish, they have been a constant source of wealth to Spain. In the early days poor Spaniards who visited this country returned with their ships laden with booty. The foreign trade in 1896 amounted to about \$3,500,000.

Of exports, manilla hemp is the chief. Sugar ranks second, and tobacco third. Rice, sweet potatoes and other produce are sold, but the possibilities of the islands in agricultural pursuits are far from being realized. Oranges, mangoes, tamarinds, guavas and cocoanuts, the chief fruits, are grown with little difficulty. The native forests yield many valuable woods and dye stuffs. Among them are ebony, logwood and ironwood.

The minerals are rich in quantity and variety. Gold, copper, lead, iron and sulphur are abundant, while many others are found in smaller quantities.

Should modern enterprise free the country from the present in-

dolent and incompetent control of the Malays, great wealth, which must otherwise lie idle, will be given to the world.—Rocky Mountain Educator, December, 1897.

Rhodesia.—The following paragraphs are selected from an account of the Economic Value of Rhodesia, given by Mr. E. C. Selous, in the Scottish Geographical Magazine, for October, 1897.

"To begin with the climate. It must be obvious that the hygienic conditions of a country like Rhodesia, which is larger than France and Germany put together, and which includes the lowlying valleys of the Zambezi and the Limpopo, as well as the high open downs of Matabililand and Mashonaland, must be very diverse; and it may be broadly stated that only those portions of the country are suitable to North Europeans where the altitude above sea-level renders the climate temperate. For in tropical Africa malarial fever is the white man's most deadly enemy-an enemy in whose despite Europeans can never hope to establish themselves and colonize the country; and, as this most insidious disease is everywhere prevalent in Rhodesia where the altitude is less than 4,000 feet above sea-level, it is only the elevated backbone of the country, which forms the watershed between the Zambezi and the Limpopo in the west, and the Zambezi and the Sabi in the east, which can be looked upon as likely to become peopled by white men; while in eastern Mashonaland, where the country is extremely well watered, many people suffer much from feverthough of a very much milder type than in the hot tropical lands in the basins of the great rivers—even up to an altitude of over 5,000 feet. Still, I think that the cultivation of the land and the draining of the swamps will gradually eliminate the cause of fever on the highlands, and I look upon all those portions of Rhodesia which lie at an altitude of over 4,000 feet above the sea as certainly destined to become peopled by white men. Possibly in the . distant future, when the highlands of Rhodesia have become thickly peopled, the white man may be able to extend his livable area to a somewhat lower level than the 4,000-foot altitude, below which I now consider the country unhealthy for Europeans; but as almost the whole country at present lies waste, it would be as well to settle up the highest and healthiest portions first. The superficial

area of that portion of Rhodesia which lies at an elevation of 4,000 feet and upwards, extends to approximately 26,500 square statute miles, whilst 72,500 square statute miles may be added which lie between 3,000 and 4,000 feet. The whole of the watershed, which extends from some twenty miles to the westward of Buluwayo, northeastwards to Salisbury, and from thence southeastward to the sources of the Ruenya, Odzi and Pungwe rivers, attains an altitude which is never less than 4,700 feet, and which rises to the east of Salisbury to from 5,400 to 6,000 feet, and in the Inyanga country at the source of the Ruenya river to over 7,000 feet.

"Once beyond the range of the fever, however, the climate of this part of Africa is probably one of the finest in the whole Even in the hottest weather the heat is not excessive, for the thermometer seldom registers a temperature of over 90° in the shade on the high plateaus of eastern Mashonaland—and 90° in the shade is not very trying at an altitude of 5,000 feet-whilst the nights are always cool and bracing the whole year round. During the winter months, namely, in May, June and July, the nights are cold and frosty and the days bright and clear-pleasantly warm, but not hot. During the months of November, December, January, February and March, heavy rains may be expected, with thunder storms during October and April, and sometimes a little light rain during the winter months. The rainfall is, however, very unevenly distributed over the five months I have mentioned, as in some years continuous rain sets in early in November, whilst in others little or none falls till late in December. a rule, the heaviest rains take place after Christmas. The average annual rainfall would be probably over forty inches, though of late years it has frequently been much below that figure, droughts or inadequate rains having been prevalent all over South Africa since 1891. In the rainy season, which ended in April of that year, . however, a rainfall of fifty-three inches was recorded in Salisbury, Mashonaland.

"Another plague from which South Africa has been suffering of late years is locust swarms. For seven years these winged hosts devastated the whole country from the Cape to beyond the Zambesi, causing famine amongst the natives and making agriculture well nigh impossible. In the autumn of 1895 I cleared about

forty acres of waste land in the Matabili country, and sowed some thirty acres with maize, planting the remaining ten acres with blue-gum trees. In the following February I had a nice crop of The stalks stood about three to four feet high. maize coming on. and the cobs were already forming. One afternoon the Kaffirs called my attention to a vast cloud of locusts drifting up over the hills to the southeast. Nearer and nearer they came, and about four o'clock settled in one dense mass, like a heavy fall of snow, on my thirty-acre maize patch. In two hours there was nothing left but the bare stalks; and some of these were actually eaten off to within a foot of the ground. The maize patch seemed to satisfy the locusts for the time being, but the next morning a lot of them turned their attention to an acre and a half of melons. where some of the fruit was fast ripening. They did not interfere with the melons, but effectually destroyed them by eating off all the leaves and stalks, leaving the fruit to dry and shrivel up.

"The natives, of course, only raise crops during the rainy season. They grow maize, three kinds of kaffir corn (sorghum), ground nuts, three varieties of beans, pumpkins, gourds, water melons, sweet potatoes, and in Mashonaland, tomatoes, peas and most excellent rice. The European missionaries have successfully cultivated wheat and many different kinds of fruits and vegetables in their gardens." R. E. D.

Some Features of Mexico.—Geographically Mexico extends in a northwesterly and southeasterly direction for 1,200 miles between latitudes 32° 40′ and 14° 30′. Politically Mexico is divided into twenty-seven states, the Territory of Lower California and the Federal District of the City of Mexico. It contains nearly twelve million inhabitants, or one-sixth the population of the United States; its area is one and one-quarter million square miles, or a little over one-third that of the United States: its average population is about ten per square mile, or less than one-half that of the United States. Within its borders are seventeen cities of over twenty thousand inhabitants each, of of which three contain over fifty thousand and two over one hundred thousand inhabitants. The main thoroughfares of Mexico consist of about 6,500 miles of railroads, but little more than suf-

ficient to twice span the distance between New York and San Francisco; and in addition there are a number of good macadamized roads, built chiefly during the days of the Empire.

According to common beliefs, Central Mexico consists of a vast plateau. In fact, it is a great basin or depression ribbed with many irregularly disposed and disconnected mountain ranges, buttes and isolated ridges which are separated by broad valleys and plains. Many of these plains are the beds of ancient lakes, like those of Salt Lake or Humboldt valleys in Utah and Nevada, and have no drainage outlet to the sea. The basin-like character of this central region is accentuated by the mighty mountain barrier of the Sierra Madre which towers above it on the west; by the lesser and more disconnected Sierra Madre of the east; and by the gigantic volcanic cones which dominate it on the south.

A glance at the basin valleys of Mexico, near the northern borders of the Republic, shows that there they have their least altitude and greatest area. Like the neighboring portion of the United States, this region consists of vast desert plains relieved by narrow mountain ridges or the rugged outlines of faulted mesa edges, cut by the many cañons and barraneas which mark the drainage lines of the country. An excellent example of this type of topography is seen in the bolsons west of El Paso. Looking southward across the river at El Paso, toward Juarez, in Mexico, are seen the faint outlines of these bolsons in which are buried the bases of the distant barren mountains. Southward the plains of the Basin region diminish in area, while its desert mountains increase in number and altitude. Toward the geographic centre of Mexico the plains have dwindled to large intra-montane valleys, until finally, in the neighborhood of Zacatecas and Querétaro, they are but narrow valleys separating giant mountain ranges.

Toward the northern boundary of Mexico the Sierra Madre mountains of the east attain their least height and are entirely devoid of cordilleran aspect, consisting of isolated ranges and lost mountains, and merging near the neighborhood of the Rio Grande into the desert plains and mesas of western Texas and southern New Mexico. Southward, near Monterey, they begin to lose their disconnected character and to form a more united and conspicuous mountain mass, and but one hundred and fifty miles farther south,

below Victoria, they unite in a superb elevated mass where calminate all the topographic characteristics of the west. To the north the cordilleran type is lost in isolated cerros, the peculiar forms of which are typified by "la Silla" or "the Saddle" near Monterey, which is by far the most conspicuous feature in a mixture of desert plain and jagged hills. The general character of these desert sierras is bold and striking, as is well shown by the names given them.

To the eastward is an extensive and rugged decline which slopes for fifty miles and terminates in the coastal plain of the Gulf of Mexico, over a mile vertically below. To the south the Sierra Madre of the East continues to rise in stupendous mountain masses which culminate in the volcanic cones of Orizaba and Popocatepetl. To the west are the vast arid deserts of the central basin region, glistening with huge patches of dazzling white, the dried and alkali-incrusted beds of ancient lakes, bristling with a scanty growth of sage brush and cactus, and mottled with rugged mountain forms.

One of the most forbidding of the numerous varieties of each which clothe this region is the "ocatea," which resembles a cuttle-fish buried to his nose in the earth, only his arms waving in the air. These are from five to fifteen feet in height, the whipstock arms being without branch or joint, but covered close as they can be set with heavy recurved thorns like tiger's claws, and almost as large. Then there is the "tree yucca," tall, big of trunk and branched like an oak, and bearing on the end of each arm a bunch of bayonet-shaped leaves, the dead stems of which form the bark and are so dry that, when lighted, the whole flames up like a huge election-night pyre of tar barrels. And, finally, there is the "pitahaya," mightiest of cacti, which, as single stems or branched, looks like great green telegraph poles or giant candelabra.

The Sierra Madre of the West, like those of the east and the central basal region, are least conspicuous, and attain least altitude near the northern border of Mexico. Along the international boundary the hills are disconnected and without regular system, the highest summits rarely reaching six thousand feet in altitude; thence southward these hills mass together in most irregular and confusing manner, increasing in height and number until in north-

NOTE8. 75

ern Durango and Sinaloa they have assumed cordilleran proportion and height.

Close to the City of Mexico is the mightiest of North American mountains, Popocatepetl, the altitude of which is 18,020 feet. The best view of this magnificent peak is perhaps obtained from the Aztec pyramid at Cholula. Near here is the peak of Iztaccihuatl, the altitude of which is 17,290 feet, best seen from the plains of Amecameca. Finally, from the main street in Cordova, is seen Orizaba Peak, 17,870 feet in altitude, most beautiful of all the Mexican volcanoes, and one of which the tourist has an easily accessible view from the line of the Vera Cruz Railroad.

The line of volcanic peaks in which the two Sierras Madres terminate and which forms the southern rim of the Basin region, may be likened to the apex of the letter V, the two arms of which correspond to the general outline of the Mexican cordillera, and here these mountains extend in unbroken mass from sea to sea, terminating precipitately to the south in great escarpments facing the coast and the Valley of the Rio de las Balsas. This is practically the southern terminus of the North American Cordilleran system, the culmination of the mountain grandeur of our continent, having no superior in the world for picturesque beauty.

South of the Rio Balsas is a narrow and precipitous mountain range attaining altitudes of ten to twelve thousand feet and separating the Valley of the Balsas from the Pacific Coa t. This range of mountains is fairly homogeneous and continuous to its culmination in Oaxaca, near the Isthmus of Tehuantepec, whence a northern spur connects it around the head of Balsas Valley with the volcanic scarp. At the Isthmus of Tehuantepec this mountain mass falls suddenly to within a few hundred feet of the level of the sea, beyond which the great Antillean system rapidly assumes cordilleran proportions, culminating in a summit exceeding fourteen thousand feet in altitude on the boundary line between Mexico and Guatemala.

In the limited area north of the Isthmus of Tehuantepec are twenty giant volcanoes, including Orizaba and Popocatepetl. Nearly all of these are more or less active and give signs, at least by the emission of gases and vapors, of living energy beneath. Ceboruco, the main crater of which is a pit one thousand feet in

depth, was in violent eruption in 1870. Colima, the altitude of which is nearly eleven thousand feet, has been intermittently in eruption ever since Europeans first beheld it, its most vigorous outbursts having been in 1820 and 1870, continuing on each occasion for many years.—Bull. Am. Geog. Soc., XXIX., 3, 1897.

Southwestern Patagonia.—Five years ago no white men were living in the territory in question, except perhaps, in summertime some few ostrich or lion hunters, but now that is all altered. Nobody has tried, it is true, as yet to utilize the forests, here on the landslide consisting of Fagus antartica, or the coals and minerals, traces of which have in some parts been met with, but the open land is now largely occupied. A great part of the territory, however, cannot be made of practical use; the higher tableland is almost barren, the slopes and the hilly land in the west are often overgrown with a very annoying plant, a prickly species of an Azorella, forming rounded hemispherical tussocks. times the ground is swampy, and on the open pampa the vegetation is mostly very poor. But, on the other hand, there is grass in many parts, it being, especially in the river valleys, of a very rich and soft quality; indeed, comparatively speaking, the greatest part of the country is covered with grass, not very luxuriant in places, but forming an excellent pasturage for sheep. The uniform climate, too, is very well adapted for sheep, and so sheepfarming has been the principal branch of industry, cattle and horses, however, being also sometimes kept. The coasts of the Straits of Magellan and of the Atlantic have long been occupied, but just lately many settlers have taken up their quarters in the Gallegos Valley and in the region between Last Hope inlet and the lakes right away towards the dry Patagonian pampa. Until recently land could be got very cheaply, and there is still a lot of good "camp" unoccupied, but that state of things will not last long. Most of the settlers are English-speaking people, hailing from England, Scotland, the Falkland Islands or Australia. The wool is brought down to Punta Arenas, Port Gallegos or to Last Hope Inlet, where there is a kind of harbor, to which steamers come from Punta Arenas twice or thrice in the year to bring the provisions necessary for the immediate future.

Meanwhile the original inhabitants of the country, the Pata-

gonian or Tehuelche Indians, are being rapidly driven back towards the uninhabitable central territory. It is long since the time when they were described as a race of giants, but undoubtedly they are extremely handsome, tall fellows, a really fine people. Those still surviving are all civilized, and there is not the slightest danger for the traveller in associating with them. They often possess fine troops of horses; some of them also own cattle. Many speak Spanish, and once or twice a year they go down to Punta Arenas or to Gallegos to exchange their guanaco mantles and ostrich feathers for different kinds of provisions and implements. But the number of guanacos is diminishing day by day, the land is being absorbed and the Indians impoverished by the white traders; they are getting mixed with the whites, and so the day cannot be far off when the last Patagonian in the old sense shall have ceased to exist.—Geographical Journal, October, 1897.

Industries of Thessaly.—The Turkish Government seems to be very reluctant to evacuate the province of Thessaly, and the long period over which the negotiations of the great powers are being drawn out serves only to give Turkey the opportunity of establishing a firmer foothold. The entire system of the Ottoman Government has been put into effect, fortifications strengthened and many fresh troops brought into the country since the signing of the truce. Even should peace be signed to-morrow and the refugees be allowed to return to their abandoned homes, several years would be required to repair the damage done and to reëstablish life and industry on their former basis. The Turkish troops have profited by the harvest season to reap and appropriate the grain, which last year amounted to 4,440,000 bushels of wheat, 951,430 bushels of Indian corn and 1,287,700 bushels of barley. The evil effect of this loss is already noticeable in the increased importation of foreign grain and the rise in the price of bread between one and two cents per loaf.

The sheep and cattle which were not driven away by the fleeing inhabitants have gone to feed the Turkish army. This is also a serious matter for Greece, as the principal meat supply has hitherto been derived from the captured province. Last year

this product of Thessaly numbered 2,000,000 sheep and 30,000 cattle. This latter industry is only in its infancy in Thessaly and with proper attention should grow to large proportions, the well-watered hillsides and fertile plains being especially favorable to it.

In ancient times, the horses of Thessaly were celebrated throughout the civilized world, and should be so to-day. Owing, however, to the improvidence of the Greek people, all their good horses are imported, and during the late war, commissioners were sent to Hungary to buy horses for the cavalry and artillery, for which they paid 800 francs (\$154.49) and upwards a head. The first great rout of the Greek troops at Larissa was due to the superiority of the Turkish cavalry.

Although the development of Thessaly was rapidly progressing, large tracts of it had not as yet been brought under cultivation, owing to scarcity of laborers and lack of modern agricultural implements. Of late, however, many laborers have flocked thither during harvest time from Turkey and Asia Minor and from the other provinces of Greece. For the last few years, Thessaly has been supplying one-third of the whole wheat supply of Greece.

Besides grain, the chief agricultural products of Thessaly are fresh fruits of all kinds, vegetables, nuts, sesame seed and oil, to-bacco, lumber, olives and olive oil, wine, and beet root for sugar.

— Consular Reports, December, 1897.

Africa.—Mr. G. F. Scott-Elliott in his book called A Naturalist in Mid-Africa, considers the effect of altitude upon life and divides the region into four zones: (1) the palm zone below 3,000 feet, (2) coffee zone from 3,000 to 5,000 feet, (3) zone fitted for white settlements 5,000 to 7,000 feet and (4) the cloud belt above 7,000 feet.—R. E. D.

Ecuador.—Mr. Mark B. Kerr, gives a short account of a journey in Ecuador in the National Geographic Magazine for July, 1896.

Between the River Mira on the north of Ecuador and the River Santiago there is an interior sound, deep and narrow, comparable to the sounds formed by drowning at the west of British America. In this region the Andes rise abruptly from the Pacific to the great heights of Chimborazo (20,498 feet) and Cotapaxi (19,480 feet). The rough road from Guayaquil to Quito crosses the Andes just south of Chimborazo at an elevation of 14,000 feet.

REVIEWS.

Around the World. A Primary Geographical Reader, Book I. By STELLA W. CARROLL. The Morse Company, 1897. Pp. 159.

The first book of the Around the World Series, proposed by The Morse Company, which has just appeared, deals with the Eskimo, Indians, Arabs, Dutch, Chinese and Japanese, the people which, to our children, are the most curious and interesting. The reading matter is simple and indeed "primary," but usually truthful and devoted to the essentials rather than the unessentials. The conceptions that the youthful reader would acquire would usually be clear and as complete as could be expected, though one can readily question the impression a child would have of a desert, when it is described as "a field of sand."

The many illustrations are well selected and well executed, though in most cases the introduction of a scale would have been better; as for instance in the case of the Indian canoe, on page 60, which, as printed, might seem to the child like a pea-pod boat. It is very gratifying to see so many illustrations devoted to implements of industry and warfare, and other objects that give us faithful impressions of habit and customs. Particular mention should be made of the illustrations in the chapter on the Japanese, and especially those of the silk-worm.

Though geographical readers for all grades are appearing at a rapid rate, there is as yet no one set which can be adopted as a standard. Variety gives better choice for the individual teacher, and the reader in question well deserves to be numbered among the few books from which the primary teacher must make her final choice for class use. Surely every school library of any size or completeness should have this book on its shelves for reference.

R. E. D.

Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading. Hugh Robert Mill. Longmans, Green & Co., 1897. Pp. 142.

The small and inexpensive book whose somewhat lengthy title appears above, is one of the most helpful of recent additions to geographical literature. The "Hints to Teachers" consist of short chapters on the Principles of Geography, the Teaching of Geography, the Choice of Text-books, etc., with short summaries of the scope of the various branches of geography. part of the book is devoted to selected series of reference books on various subjects, with practical comments as to the comparative value of the books instanced. Dr. Mill is an authority on bibliography, a man of broad geographic interests and knowledge, and a leader in geographical progress. He has compiled his book without the knowledge of any publishing house, and thus there is no reason to consider his words of comment as being other than un-Though the references are not complete, they are sufficiently so for any teacher except in regard to the home localities of the user. The book as a whole, because of its broad scope and suggestive content, should become the daily companion and counselor of every normal school teacher of geography, and all progressive teachers of grade schools. Though compiled mostly for use of teachers in England, the book is just as valuable in the United States, and has no close rival in the field, as far as our knowledge goes.

References are given for books under the following headings: Books on Methods; Text-books; Atlases and Maps; General Reference; Mathematical Geography; Physical Geography; Bio-Geography; Anthropo-Geography; British Empire; Europe; Asia; Africa; North America; Central and South America; Australasia and Pacific Islands; Polar Regions and General Travel and Biography. Very helpful rules are given as to the spelling and pronunciation of place names, as determined by the Royal Geographic Society. These rules should be at the ready command of every common school teacher, both as an aid in good geography and literature teaching.

We commend the book to all our readers, and wish it every success on both sides of the Atlantic.

THE



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THE SPELLING OF GEOGRAPHICAL NAMES.

The Royal Geographical Society of London long ago established a series of rules for the spelling and prounciation of geographical place names. These rules are, in their essentials, now accepted by the United States Government, and hence the need of every teacher having the rules for ready reference. The Editors, therefore, take pleasure in giving below the rules as stated by Dr. Mill in his recent book (noted on p. 80,) "Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading."

RULES FOR SPELLING.

- 1. No change is made in the orthography of foreign names in countries which use Roman letters: Thus Spanish, Portugese, Dutch, etc., names will be spelt as by the respective nations.
- 2. Neither is change made in the spelling of such names in languages which are not written in Roman characters as have become familiar by long usage to English readers: Thus Calcutta, Cutch, Celebes, Mecca, etc., will be retained in their present form.
- 3. The true sound of the word as locally pronounced will be taken as the basis of spelling.
- 4. An approximation, however, to the sound is alone aimed at. A system which would attempt to represent the more delicate in-

flexions of sound and accent would be so complicated as only to defeat itself. Those who desire a more accurate pronunciation of the written name must learn it on the spot by a study of local accent and peculiarities.

- 5. The broad features of the system are:
- (a) That vowels are pronounced as in Italian, and consonants as in English.
- (b) Every letter is pronounced, and no redundant letters are introduced. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in ai, au, ei.
- (c) One accent only is used, the acute, to denote the syllable on which stress is laid. This is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."
- 6. Indian names are accepted as spelt in Hunter's Gazetteer of India, 1881.
- 7. In the case of native names in countries under the dominion of other European Powers in whose maps, charts, etc., the spelling is given according to the system adopted by that Power, such orthography should be, as a rule, disregarded, and the names spelt according to the British system, in order that the proper pronunciation may be approximately known. Exceptions should be in cases where the spelling has become by custom fixed, and occasionally it may be desirable to give both forms.
- 8. Generic geographical terms, e. g., those for island, river, mountain, etc., should be, as a rule, given in the native form. In the case of European countries, translation into English, where this has been the custom, should be retained, e. g., Cape Ortegal, not Cabo Ortegal, River Seine, not Fleuve Seine.

PRONUNCIATION.

LETTERS	8. Pronunciation and Remarks.	EXAMPLES.
a	ah, a as in father	Java, Banáns, Somáli, Bari.
e	eh, a as in fate	Tel-el-Kebír, Oléleh, Yezo, Medina, Levúka,

i	English e; i as in ravine; the sound of	
	ee in beet. Thus, not Feejee, but .	Fiji, Hindi.
0	oas in mote	Tokyo.
u	long u as in flute; the sound of oo in	
	boot. oo or ou should never be em-	
	ployed for this sound Thus,	
	not Zooloo, but	Zulu, Sumatra.
	All vowels are shortened in sound by	
	doubling the following consonant	Yarra, Tanna, Mecca, Jidda, Bonny.*
	Doubling of a vowel is only necessary	Donuy.
	where there is a distinct repetition	
	of the single sound	Nuulúa, Oosima.
ai	as in aisle, or English i as in ice	Shanghai.
au	ow as in how Thus, not Foochow,	S
	but	Fuchau.
a o	is slightly different from above	Macao.
aw	when followed by a consonant or at	
	the end of a word, as in law	Cawnpore.
ei	is the sound of the two Italian vowels,	•
	but is frequently slurred over, when	
	it is scarcely to be distinguished	
	from ei in the English eight or ey in	
	the English they	Beirút, Beilúl.
b	English b .	•
c	is always soft, but is so nearly the	
	sound of s that it should be seldom	
	used	Celébes.
	If Celébes were not already recognized	
	it would be written Selébes.	
ch	is always soft as in church	Chingchin.
d	English d.	
f	English f. ph should not be used for	
	the sound of f. Thus, not Haiphong,	
	but	Haifong, Nafa.
. g	is always hard. (Soft g is given by j)	Galápagos.
h	is always pronounced when inserted.	
hw	as in what; better rendered by hw than	
	wh, or h followed by a vowel, thus	
	Hwang ho, not Whang ho, or Hoango	
	ho	Hwang ho, Ngan hwi.

^{*}The y is retained as a terminal in this word under Rule 2 above. The word is given as a familiar example of the alteration in sound caused by the second consonant.

j	English j. Dj should never be put for	T Ti-shus-
k	this sound	Japan, Jinchuen.
kh	for the hard c. Thus, not Corea, but The Oriental gutteral (the German and	Korea. Khan.
gh l)	Scot ch)	Dagh, Ghazi.
$\left. \begin{array}{c} \mathbf{m} \\ \mathbf{n} \end{array} \right\}$	As in English.	
ng p	has two separate sounds, the one hard as in the English word finger, the other as in singer. As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them. As in English.	
ph	As in loophole	Chemulpho, Mokpho.
th	stands both for its sound in <i>thing</i> , and as in <i>this</i> . The former is most com-	
q.	mon	Bethlehem. Kwangtung.
	When qu has the sound of k as in $quoit$, it should be given by k .	ixwanguung.
r s sh t v w x	As in English	Sawákin.
У	is always a consonant, as in yard, and therefore should never be used as a terminal, i or e being substituted as the sound may require. Thus, not	Kik úy u.
	Mikindány, wady, but not Kwaly, but	Mikindáni, wadi. Kwale.
z h	English z	Zulu.
zh	The French j or as s in treasure Accents should not generally be used, but where there is a very decided emphatic syllable or stress, which affects the sound of the word, it	Muzhdaha. Tongatábu, Galápa- gos, Paláwan, Saráwak.

should he marked by an acute accent.

SOUTH CAROLINA.

Most of the animals native to the southeastern United States are found here. The fox, raccoon, opossum, squirrel, rabbit, mink and muskrat, with thrushes, wrens, swallows, sparrows, hawks, quail and many other birds range over the entire State. In the mountains are also found the deer, the bear and an occasional wolf. In the swamps of the low country the deer, the bear, the otter and the rice bird, known in the North as the bobolink, are found; while the rivers of this region contain the alligator, the sturgeon, and many food fish. The eagle and the wildcat are sometimes found. Ducks and wild geese abound in winter along the coast and in the river swamps. The buffalo, the elk, the beaver, the panther, the ivory-billed woodpecker and the Carolina paroquet were once abundant, but are now extinct.

In the low country the palmetto, the magnolia, bay, long-leaf pine, live oak, cypress, juniper, Spanish moss, yellow jasmine and many other trees and plants characteristic of a warm or semitropical climate abound. On the piedmont these are replaced by the short-leaf pine, oak, hickory, poplar, maple and other hardwood-trees. On the mountain sides hemlock, white pine, walnut, laurel, rhododendron and other trees characteristic of more northern regions are found.

Having glanced briefly at the physical features, the climate, the soil and the plant and animal life characteristic of the State, let us next consider the civilization that has developed in it and see how it has in very many cases been influenced or controlled by the natural environment already given.

The existence of a good harbor made by a slight drowning of the mouth of the Ashley and Cooper rivers and so situated as to be more easily defended from the Spaniards than was Port Royal, where a settlement had previously been attempted, determined the location of the first permanent settlement, soon known as Charleston. In this town the life, trade, government and wealth of the colony centered. By it the colony was made a unit, the trend of its civilization and culture was largely determined, and the entire history of the State has been greatly influenced. Had the coast

been fringed with sandbars and without good harbors, as was the case with North Carolina, the early settlements would have been scattering and the subsequent development and history of the State much different from what it has been. Though Port Royal and Georgetown were also early settled, Charleston having once attained the lead and being the capital of the colony, easily remained pre-eminent.

From Charleston as a centre most of the coastal plain and a portion of the piedmont plateau were settled by immigrants largely from England and France. Most of the piedmont, however, was settled shortly before the Revolution largely by Scotch-Irish from the more northern colonies. This original difference in origin between the population of the up-country and the low country has been maintained and in some respects even accentuated by causes mainly climatic and physiographic in essence. It has been plainly manifest at many periods in the history of the State, and is seen to-day, not only in the "manner, character and ancestry, but even," as a recent writer has said, "in the very tones of voice of the inhabitants." The distribution and strength of the various religious denominations is but another result of original differences of the character of the first settlers.

Since the first decade of this century no large additions have been made to the population of the State by immigration, so that to-day about one-half of one per cent. of the inhabitants are foreign born.

Negroes were early imported as slaves. As they were found profitable in cultivating rice, indigo and cotton, their number rapidly increased until importation was stopped by law in 1807. A remnant of the once powerful tribe of Catawba Indians yet live upon a small reservation within the State, though they now number but a scant hundred.

The total population in 1890 was 1,151,149, of whom 688,934 were negroes. In the distribution of this population, physiographic control may be plainly seen. On the warm, low-lying coastal plain the negroes are most numerous, reaching in places along the southern coast the proportion of six or more to one white. Their preponderance in certain parts of this region has given to these the name of "black belts." The existence of such belts is, at least

in good part, explained by the negro's ability to withstand malaria, enabling him to live and thrive in places formerly too unhealthy for whites. The use of artesian water, however, which is rapidly becoming common on the coastal plain, enables any one to live almost with impunity in localities hitherto considered unhealthy. These unhealthy places are usually near the great river swamps and by no means include the entire coastal plain.

In the most barren parts of the sand hills there is found a sparse population, largely of whites, who have slowly gravitated there from the more fertile regions on either side. The "sand hillers," as they are often called, are generally small farmers, are usually illiterate and poor, and are too often without ambition to improve their condition. Socially and industrially, as well as geographically and geologically, these sand hills form a barrier, as it were, between the more prosperous and progressive coastal plain and piedmont plateau regions. Fortunately the area thus characterized is not of large size.

On the piedmont the proportion of whites becomes greater, though the negroes are still in the majority. It is not until we near the western portion of the State that the whites become more numerous than the blacks. In this coldest and most elevated corner the proportion is about three whites to one black. In going then, from the seaboard to the mountains, there has been a gradual decrease in the proportion of the colored, and a corresponding increase in that of the white population. This change is due to climatic influence, in the last analysis.

Agriculture is the chief industry of the people, over six-sevenths of whom live in the country. Cotton is the chief crop, and is grown in all parts of the State except a little of the most northwestern, where it does not mature well. It has been the great money crop for years. The soil and climate of the islands along the coast peculiarly adapt them to the growth of a cotton with long, silky fibers, known as sea island cotton. It cannot be successfully cultivated elsewhere in the State. It is used in making laces and the very finest fabrics. Corn is also an important crop over the entire State. The world's record for the largest corn yield is probably held by South Carolina, since over 254 bushels have been raised in Marlboro county in a single crop on one acre of land. The small grains succeed best on the more elevated parts of the piedmont.

On the light, loamy land of the upper pine belt the culture of tobacco has recently been introduced and found profitable. The soil of this region produces a mild, bright yellow leaf that commands a good price. The culture of the plant will doubtless extend over this entire belt, and in it only will the finest quality be produced.

Rice is largely grown on the fertile river swamp lands of the coastal plain, where the fields may be flooded with water at certain stages of the growth of the plant. For years the production of this State exceeded that of any other, but recently it has fallen off, and Louisiana now ranks first in the amount produced.

Truck farming near Charleston and elsewhere along the coast has become an important industry. The short, mild winters and absence of severe frosts make it possible to market such produce long before other regions farther north. Oranges have been marketed from groves in the vicinity of Beaufort and tea is grown at Summerville. Grapes are extensively grown in a number of places on the coastal plain and the piedmont both for marketing and for wine making. Melons are extensively grown on the light, sandy soil of Barnwell and other counties, and shipped in great quantities to Northern markets. The red hill and sand hill belts are well adapted to the growth of peaches, and along the mountain slopes apples find a congenial climate and soil.

Forests of cypress and long-leaf pine cover a large portion of the low country. Formerly the gathering of naval stores from the pine forests was an important industry. Now most of the forests have been worked, and the production of turpentine and rosin is steadily decreasing. Lumbering, however, is becoming more and more important. Lumber, staves, shingles, masts, spars, cross ties and telegraph poles are shipped to home and foreign ports in large quantities. In addition, the long, gray moss is made into an upholstering material, and the pine needles are manufactured into a substitute for hemp and jute. On the piedmont the short-leaf pine and hard woods are cut for lumber and supply the material for the woodworking factories of this region.

Manufacturing has not been a prominent industry in the past. Before the war there was scarcely any, and only within the last few years has much attention been devoted to it. There is yet, how-

ever, but little diversity. Most of the development so far has been confined to cotton manufacturing. The original impulse toward manufacturing was largely due to the existence on the rivers of the piedmont of numerous falls capable of easy development. Hence it is that in Spartanburg and Greenville counties, where most falls occur, most cotton mills are found. Since, however, the industry has once gained a foothold, many mills are now built to be operated by steam power. Yet physiographic control is still seen in the fact that most of the cotton factories are confined to the piedmont. The few that have been built on the coastal plain do not seem to succeed as well as those on the piedmont, probably because of an adverse effect of the climate and humidity on the energy of the operatives and the quality of the product.

The only other lines in which much manufacturing activity is displayed is in the manufacture of fertilizer from phosphate rock, and of oil from the seed of the cotton plant. These are both important industries. The one enables the farmer to greatly increase his production of cotton; the other enables him to utilize what was formerly almost a waste product.

Comparatively little attention is given to mining. The large deposits of phosphate rock near Charleston and Port Royal usually lie at no great depth beneath the surface and are often laid bare in the beds of the rivers of that region. Mining this rock by digging and dredging has heretofore been an important industry; but, since the discovery of rich deposits in Florida and elsewhere, the production of South Carolina rock has greatly decreased, and it is feared that it may cease entirely. The State owns the rock in the beds of the navigable rivers, and the royalty received from those who mined it has constituted an important source of revenue.

Gold has been mined in various parts of the piedmont since the early part of this century. Both placer and vein deposits have been worked at various times, although the former have been wellnigh exhausted. The most important mines to-day are the Brewer in Chesterfield and the Haile in Lancaster county. These are situated on the gold-bearing belt lying near the eastern edge of the piedmont. The belt near the middle of this region is searcely worked at all to-day.

Kaolin is mined in Aikin and Richland counties, and either used

as an ingredient in the manufacture of firebrick, or shipped north to be made into porcelain or china ware or to be used as a filling in the manufacture of wall paper. Iron pyrite has been mined to some extent for making sulphuric acid, which is largely used in the manufacture of fertilizers from phosphate rock. Monazite has recently been mined extensively in Cherokee and adjoining counties, although activity has ceased for the present. It is a rare mineral in the form of a heavy, yellowish brown sand. tained from the beds of the streams where it has been collecting for ages and is used in the manufacture of incandescent gas Extensive quarries of granite are worked in Richland and Fairfield counties. In Cherokee county limestone is quarried Iron of good quality is found in a numand burned into lime. ber of places, but the quantity is probably too small to enable it to be mined with profit.

The fisheries along the coast are of considerable importance. Fish, oysters, clams, shrimp and terrapin are caught. The home markets are supplied and the surplus is canned for shipment.

The location of most of the towns and cities of the State shows plainly the determining influence exerted by the physiography. The location of Beaufort, Port Royal and Georgetown was determined like Charleston by the existence at these points of drowned river mouths forming harbors where immigrants might land in safety and through which alone the commerce of the colony with the outer world could pass. The founding of towns at these places was the natural result. Fortuitous conditions helped to give Charleston the lead, and have thus enabled her to overshadow her sister coast towns.

As settlers pushed into the interior the rivers afforded the best means of ingress. As far inward as they were navigable, that is to the inner edge of the coastal plain, they became the highways of communication with the coast. Along them settlements were made, towns were founded and early commerce developed. Hence it is that we find the older towns of the coastal plain situated on or near the rivers instead of in the inter-stream region. Barnwell, Orangeburg, Kingstree, Society Hill and Conway are examples of river towns.

It was even more natural that when the inner limit of naviga-

tion had been reached, towns should there spring up through which the tide of immigration into the country beyond should flow, and which would receive the commerce developed thereby. It happened in South Carolina, as everywhere else on the Atlantic border, that a line of falls coincided with the inner limit of navigation. These furnished excellent sites for mills. Hence, such places were possessed of both manufacturing and commercial advantages. The location of Hamburg, Columbia, Camden and Cheraw was a natural result. All throve while the rivers were the only highways of commerce. But, with the introduction of railways pre-existing conditions were changed. As a result of adjustment to these new conditions some of them are growing to-day, while others have either declined in size and importance or have been barely able to hold their own.

On the piedmont plateau the conditions were different. The rivers were no longer navigable and so could not offer this inducement for the location of towns upon them. The best town sites were furnished by the level inter-stream areas, and nearly all of the piedmont towns are located upon these areas away from the rivers and often upon the very partings between them. Occasionally, however, falls giving manufacturing advantages would determine the location of a town upon a river, as is the case with Greenville.

Allusion has already been made to the change wrought by the introduction of railways. A further result of their influence is seen on the coastal plain. Since their building river navigation has greatly declined, and river towns no longer possess the same advantage in location that they once had. It is true that they became the objective points for the railways and so saved themselves from decay. New towns, however, are no longer located along the rivers, but along the railways in the inter-stream areas, and often assume a more rapid growth than their older river rivals.

The railroads themselves furnish good illustrations of the contrast between physiographic conditions on the coastal plain and on the piedmont. The coastal plain is level for miles, and, except for swamps, presents no difficulties in the location of railway lines. As a result, the railways here have physiographic liberty to go where they please, and so many of them run for miles in perfectly straight lines. On the piedmont plateau, however, their location

is under close control. Their easiest routes lie either along a river side, as between Columbia and Alston, or more often along the ridge between adjoining river basins, as from Chester to Columbia, where a great detour is made to keep to the top of the ridge. Where it has been necessary to run across country, or across river basins, the disregard for physiographic control has involved the penalty of heavy grades, numerous curves and expensive construction, as, for example, the Southern Railway from Charlotte to Atlanta.

A study of the geographic names of the State reveals many a fact concerning the Indian aborigines, the nationality, names, character and occupation, as well as the fancies, whims and peculiarities of the early settlers. The former presence and geographic distribution of animals now extinct is readily seen, as is the former range and abundance of others now rare. The opinions of the early settlers are reflected in the names given by them, such as Hardlabor Creek, Richland, Fairfield, Fairforest and Walhalla. Much that is in many ways interesting is wrapped up in the names given to county, town and stream but, as this interest is largely local, further mention will be omitted here. It would be a profitable line of study for one specially interested in the State's geography to pursue.

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FIRST STEPS IN THE GEOGRAPHY OF THE WORLD.

After the child of eight years or thereabouts has gained a good working knowledge of the world immediately about him, the home geography, so-called, the next step in the process of geographic development is to lead him in the most logical and interesting way to a knowledge of the world. What shall be the bond of connection and what kind of images of foreign lands and the whole world should be attempted? In his study of home geography and the inter-relations of all forms of life and the inorganic features the child should know the elements of map interpretation—distance, direction and scale. As he is too young to understand projection,

world distances and directions and continental shapes can perhaps be best shown on a globe of sufficient size to be clearly seen across a small room, and yet not too large for ready use. At the same time, small text-book maps of the continents can be used for detailed work. If the first understanding of the world and its larger parts be given by means of a globe there will be less danger of hearing such statements as have appeared in the past, to the effect that the north pole is northwest of New York City, or that the magnetic pole is southwest from the north pole.

Taking it for granted that the first conception of the world should be a globe conception, the question is how to proceed abroad in our study and how to relate the new found fields to the home I have found from experience that the bond of commercial relations furnishes an interesting connective link for the child. Furthermore, if this line of procedure be followed, children can be called upon to do much of the teaching themselves, relying on their own experiences at home. They should know, for instance, what of the daily luxuries and necessities of life are grown or made in their own vicinity and what comes from a distance. condiments, drinks, clothes, ornaments, trinkets, furnishings, etc., of their own homes, however simple, are a series of laboratory materials at the ready command of every teacher. In any large city commerce is necessary to bring even the potatoes and milk to the consumer, and nearly everywhere the breadstuffs have been brought long distances. Questions that seek to explain the inter-relation of men and of countries at once arouse interest and lead to other ques-Differences of products or industries at once suggest difference in geographic conditions, and particularly differences in climates and habits of people. The people and countries of all parts of the world thus become legitimate objects of study in a logical sequence, and all the information that time will allow, about the Chinese, the Javanese, the Italians, the Laplanders, the Indians, the Negroes, etc., and about their countries, can be brought in.

In a very few months a good knowledge of the whole world, of its distances, of its globular form, of its unity, and yet of its diversity, can be given. The order of procedure from home should largely be determined by the class and not the teacher. Questions will show what commodities of the kitchen or the home the

child considers most essential and interesting. These commodities should be traced back, perhaps through the processes of manufacture, to their crude form and then to the place of production. Thus the class may want to lead the way to study all the warm countries first, or may want to pass from cold to warm and back again with considerable rapidity, and, perhaps, to some in an irrational way. Yet if the relation of the pupils to these countries be shown, and no country be taken up because some child has heard that the people or their customs are "curious," the line of progression is most sensible.

The commercial link naturally leads to the study of other factors of the child's life or knowledge that can be used as materials for individual work by the pupils. Commerce means transportation. Transportation may be slow or fast, by canal, caravan or steam railway, by sailing or steam vessels. Any child will see at once why some freight cars are marked perishable, and why bricks and road-making materials are more apt to be transported by canal boat than are pears or bananas; why cotton does not come from Savannah or Galveston to New York by railroad so much as by steamer. The study of the means of transportation for both local and foreign commerce can well be introduced at this point. Water communication means harbors. In each country taken up, therefore, the principal seaport towns should be mentioned and located. Harbors and sea coasts suggest lighthouses, light vessels, life-saving stations, pilots and other means of saving life and expediting the clearing or entry Many children know of these branches of the Government service by experience, and their knowledge should be made of use for the class benefit, and the teacher could well afford to amplify these topics and illustrate them in detail. The stness of positions of lighthouses offers a good opportunity of introducing the study of capes, islands, bars, shoals, peninsulas, etc., and the child can thus get information of earth features and acquire the well known definitions without memorizing unmeaning words.

In the old days orders for goods were carried by messenger, and the time passing between the order and the receipt of goods was long. Here is a chance to contrast the old with the new, and to explain the geographic and economic value, and the features of the Penny Post and Post Office, of Telephones and Telegraphs, of

Ocean Cables, etc., all of which bring the countries of the world into closer relation, and make commerce possible to a greater extent. By this link, history can be introduced, and its relation to geography shown. Indeed, the skillful teacher of the early grades will not label her teaching one thing one period, and another the next, but will recognize that matter and not names is the essential thing in education.

Again, commerce—buying and selling—means to the child the The present form of trade should then be contrasted with the old form of barter, now yet to be seen among the simpler and less civilized peoples, where haste is not a necessary The units of money, as representatives of wealth, can well be introduced here in connection with geography work. Any child will be able to furnish facts regarding the materials used for money, and will contrast favorably and unfavorably the silver and paper dollar. They will readily work out for themselves the reasons why gold, silver, copper and nickel, and not lead, tin and iron, are used for money. The dinginess and lack of clearness of an old cent or quarter, as compared with a new, will show them why even the best of money does not retain its value at a permanent amount, and many a child will use as an illustration of the wear of money the grimy condition of the hands of the car conductors.

In these various ways, home and foreign geography can be combined to profit, and much useful information of life given. In manufacturing or commercial centres this kind of geography work will help the child to understand the daily occupation of his parent as no other work will, and geography will become practical. Again in such centres these topics will allow for excursions of great value, to mills and factories, to grocery stores, to wharves and docks, to railway stations, and to a host of places of interest to the child, which have ever been full of fascination to him, but which have never been explained.

Surely, practical education should be the aim of all teachers, and practical geography is possible from the earliest years. By such a path as I have outlined, any teacher can give training in practical world knowledge of great value, and can illustrate her topic fully by the daily experiences of the child. Pictures and museums,

valuable adjuncts as they are, are not necessary. Practical, cominercial geography can be illustrated in every school, no matter how remote from large towns or manufacturing centres.

RICHARD E. DODGE.

SOME SUGGESTIONS FOR TEACHING ELEMEN-TARY METEOROLOGY.

A very clear idea of the eddies of air at areas of high and low barometer must be gained by the pupils, if the present scheme of study is to be completely successful. Teachers will find such diagrams of the ideal arrangements of winds at these areas as are given in text-books on meteorology and in the various Weather Bureau publications most valuable for reproduction on the blackboard. In all cases, however, great care should be exercised not to leave in the pupils' minds an exaggerated idea of the force and velocity of the spiral motion at ordinary areas of high or low pres-In cyclones such as prevail in the tropical regions, and in the tornadoes which are occasionally experienced in the United States, we have instances of areas of low pressure accompanied by violent winds and possessing a clearly marked "eye," or centre of the storm. But such phenomena are exceptions to our weather. rather than the factors which largely control it. They must not be confused with the "lows" of the weather maps, which are eddies of very large diameter in which the winds are slow moving, the rotary motion imperceptible, and the "eye," if noticeable at all, very faint.

If the pupils find difficulty in perceiving a rough modification of the ideal circulation in the composites traced from the maps, the whole matter may usually be made clear by having several radii and a couple of smaller, concentric circles added to the figures on the tracing paper. With the aid of these, it will appear that the arrows at low pressure areas cross the radii in the direction opposite to the movement of the hands of a watch, those at high pressure areas in the same direction as the hands of a watch, and that all arrows, instead of following the circumferences of the circles as in circular motion, are crossing them toward the centre in

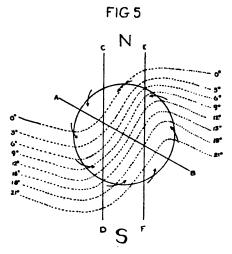
the former, away from the centre in the latter case. These conditions are fulfilled only when the general motion is as pictured in Figs. 2 and 4 on page 61.

A question as to what must become of the air which moves in from all sides toward a region of low pressure, will lead the pupils to see the necessity for an ascending air current over the central Similarly, a descending air current at the centre of a region of high pressure will be seen to be necessary in order to maintain the outward flowing winds. In this way, the system of compensating currents may be constructed, by which the air that rises at the low-pressure region overflows aloft, settles at the highpressure region, and flows outward again as a feeder to the "low." Evidences of such a system have already been met with in the winds which were found to blow from the "highs" toward the "lows." Others will appear in the results which necessarily follow the cooling of ascending and the warming of descending air currents, and in the motion of the upper air indicated by the behavior of high clouds.

The arrangement of the winds at areas of low pressure gives to such regions a very characteristic distribution of temperature. Grammar school pupils may make this clear to themselves with the aid of a square of tracing paper having upon it a circle, six inches in diameter, divided into quadrants by two lines intersecting at right angles at the centre of the circle. One of these lines should be selected for a north and south line, and so marked. This figure should be placed in a proper position over a "low" of the map, and upon it, should be marked the position of each station within the circle. The exact location of each Weather Bureau station should be indicated by a small dot, and near this should be placed the thermometer reading for the station, obtained from the table appended to the map. A chart convenient for examination The average temperature for each quadrant should In this way, it will be established that the then be obtained. northwest is the coldest portion of an area of low pressure, and the southeast the warmest. Occasionally this will be modified by local conditions, as will be explained later.

If the chart showing the composite of winds at low-pressure areas be compared with this chart of temperature, the cause for

the characteristic arrangement of temperature will, very likely, be suggested by the pupils themselves, as the southeast quadrant is manifestly fed by warm, southerly winds, the northwest quadrant by cold, northerly winds. It is well to verify this conclusion, however, by such direct proof as is furnished by the pupils' readings of the school thermometer. Have a rough tabular form ruled with eight columns, one for each main point of the compass. In one column have the pupils place the thermometer readings for those days of the month when the prevailing wind direction was north; in another, the readings when the wind was northeast, etc. Then, by



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averaging each column separately, they will find that, as a rule, southerly winds give higher temperatures, and northerly winds lower temperatures. At localities near the Great Lakes or seacoast, where the winds often blow in from over the water, this may be modified somewhat through the fact that the great capacity of water for heat renders it warmer than the land in winter and colder in summer. It will not be difficult to detect such influences where they occur.

Two effects of the distribution of temperature just found require particular attention. The first is seen in the marked "warping" of the isothermal lines in passing across areas of low pressure (Fig. 5). In many instances, this is sufficient to give them a direction due north and south. The pupils should be required to examine the course of the isotherms on several maps, and to compare each case with their charts of the distribution of temperature at low-pressure areas. Practice in oral description should be given, also, until they have no difficulty in expressing just what a bend in any direction, in an isothermal line, indicates concerning the temperature of the enclosed region as compared with that of the surrounding country.

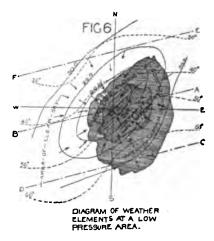
A second effect, according to Ferrel, is seen in the characteristic shape assumed by the isobars around an area of low barometer. Since warm and cold air do not readily mingle, there is a sharply defined region in the southwest where the cold northwesterly winds and warm southerly winds meet, and again in the northeast, where the warm southeast winds meet the cold winds from the north. These are regions of low pressure, and hence the central low-pressure area is very much elongated toward the northeast and southwest.

The distribution of temperature for high-pressure areas admits of similar study. Here, however, much greater irregularity will be met with than was found for areas of low pressure. In general, the central portion will be found colder than the surrounding margins, while the coldest marginal area will be found on the eastern side. This is, doubtless, due to radiation. The presence of a large amount of vapor in the air prevents the passage of the sun's heat to the earth and of the earth's radiations outward into space, while clear air allows both to pass readily. The descending air of the high-pressure areas, since it is constantly becoming warmer, is constantly increasing its capacity for moisture, and hence it remains prevailingly clear. The sun's rays beat down unobstructedly by day, and excessive radiation takes place at night. As a result, the diurnal range is very great, and the average temperature for the day somewhat low. These temperature effects are most marked within the central region because the downward motion of the air is there greatest. Any irregularities in the general distribution of temperature probably result from unequal radiation at the various stations.

This distribution of temperature causes the characteristic

arrangement of the isotherms at high-pressure areas. Usually, a small, looped isotherm, near the centre of the area, encloses the coldest portion. To the westward, the crowding of the lines shows the rapid rise of temperature in that direction. On the eastern side, the more widely separated lines, with a marked bend to the southward, show the general low temperature of that region, and particularly of the northeast.

The general phenomena of winds and temperature for areas of high and low pressure having been traced out in the course of the preceding exercises, attention may next be directed toward the sort of weather accompanying such areas. In this, again, the method of drawing off the particular thing being studied upon a sheet of



tracing paper will give most satisfactory results. It combines in one chart the conditions existing on several maps, and, therefore, furnishes, in itself, a generalization. It concentrates the attention by excluding all phenomena other than those under immediate examination. The sheets for this exercise should be prepared as for temperature, with the addition of a second, smaller circle within the first.

The weather at areas of low pressure may be considered first. The signs for clear, cloudy and stormy weather, as given in the arrows of the map, should be traced from around several "lows," until a rather crowded composite is formed. These should then be placed with the north turned from the pupils in order to give uni-

formity in direction, and the weather indicated in each portion of the chart should be carefully examined. Have the pupils consider separately, the proportion of the different weather signs in the inner circle, in the outer rim, and in each of the four large quadrants. The following general conditions will be established: (1) low-pressure areas are prevailingly cloudy and stormy; (2) the region of greatest cloud and storm is situated on the eastern side of the areas, extending some distance to the east of the centre, but only slightly to the west; (3) the region of greatest storm is the eastern half of the small circle, i. e., near the centre of the areas; (4) the extreme northwest of the outer rim is generally clear (see Fig. 6).

The teacher must expect to find exceptions to the above statements. The atmosphere is too fickle, and local conditions too varied, for absolute uniformity. That which is sought for in this study is an expression of the most common conditions. The composites of the students will, at best, agree only on certain general points. If too great dissimilarity is found, more maps should be examined, and the scope of observation extended, until agreement as to general conditions is reached. It will not be bad training in science, for the pupils, if the matter is not completely "cut and dried." The influence of near-by bodies of water must always be taken into consideration. As a rule, winter maps are not so good for this study as those of other seasons.

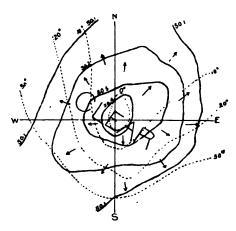
The pupils may be required to draw a line around the region where storm and cloud signs are most numerous, and also around the smaller region, lying within this, where the storm signs are thickest. These enclosed regions may be marked "cloudy" and "stormy" respectively. In this way, a rough, preliminary chart of the weather at an area of low pressure will be made.

The characteristic weather at high-pressure areas may be studied in a similar way. Such regions will be found generally clear (See Fig. 7).

The causes for the characteristic arrangement of weather at areas of high and low pressure is found in the nature of the winds at such areas. As the general explanation is not difficult, and the pupils will doubtless be ready with plenty of "why's," the teacher may well stop here long enough to give the reasons.

The argument may proceed somewhat after the plan which follows. Let the teacher place a glass of ice water on a table in the warm school-room. In a short time the glass will be covered with moisture. Require the pupils to breathe on a mirror or any bright, smooth surface. It becomes coated over with moisture. But what is the source of this moisture? It could not have come through the glass in the first case; it was not in the mirror in the second. It must have been in the air of the room and in the air breathed out, although it could not be seen before the experiment, in either case. Hence, moisture exists in the atmosphere in two forms:





WEATHER ELEMENTS AT AN AREA OF HIGH PRESSURE

invisible, or as vapor, and visible, as clouds, mist, fog, rain, etc. The first form is mingled with the other gases of the atmosphere: the second is not a part of the atmosphere at all, but is merely falling through it with greater or less rapidity, or is held up by ascending air currents. Air under all ordinary conditions contains more or less invisible moisture. The way to get it out is to cool the air, as was done in the experiments.

The nature of the winds at low-pressure areas was found to be such as to render necessary a central, ascending current. The pupils already know that mountain tops are cold and often snow-capped, and that it is a general rule that the greater the altitude

the lower the temperature. Hence, without going into any discussion of the adiabatic cooling of air, they may be led to understand that the air which rises in the low-pressure area cools, and, in consequence, some of its invisible moisture is condensed into visible moisture or clouds. Clouds and rain are, therefore, to be expected at low-pressure areas.

But why should the precipitation be greater on the eastern side than on the western? The pupils may answer this for themselves, from a study of their daily weather records, and of the chart of winds at low-pressure areas. From the former, it will be seen that south and southeast winds are usually accompanied by stormy weather, and that north and northwest winds bring clear weather. On the latter, they will see that the winds on the eastern side come from the south and southeast, those on the western side from the north and west.

The prevailing clearness at high-pressure areas has already been accounted for in the discussion of the distribution of temperature at those areas.

The pupils have now investigated quite, thoroughly nearly all the phenomena of winds, temperature, pressure and weather shown on the weather maps, and have found all to be bound together in one long chain of cause and effect. Briefly stated, they have established the following facts:

- (1) That the distribution of temperature and pressure may be represented by lines known as isotherms and isobars respectively.
- (2) That wind direction is represented by arrows which fly with the wind.
- (3) That the isobaric loops generally have their long diameter extending northeast and southwest.
- (4) That the winds at areas of low pressure blow in left-handed spirals.
- (5) That winds at high-pressure areas blow in right-handed spirals.
- (6) That the arrangement of winds at a "low" makes the northwest portion coldest and the southeast portion warmest.
- (7) That the "highs" and "lows" are part of a system of interchanging winds.
- (8) That the air in the central part of a "low" is rising, and that this renders such areas prevailingly cloudy and stormy.

- (9) That the air in the central portion of a "high" is descending, and, as a result, these areas are generally clear, with the coldest portion at the centre.
- (10) That south and southeast winds produce greater cloud and rain on the eastern side of a "low."

These should all be summed up in diagrams of the typical weather conditions at areas of high and low pressure, such as Figs. 6 and 7.

The concluding article of this series will deal with the control which the areas of high and low pressure exercise over our daily weather.

(To be concluded.)

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NOTES.

Extraction of India Rubber in Bolivia.—The tree known as Siphonia elastica, or Heyea Braziliensis, is found in the Amazon Val ley, between 2° north and 12° south latitude. The lands where it grows best are submerged at least 3 feet for two to three months each year. It grows singly and in groups, and attains a height of 50 to 100 feet, and a diameter of from 1 to 3 feet. The lands range from sea level to 700 feet above. The leaves are trifoliate, lanceshaped and very thin, 1 inch wide by 5 to 6 inches long; the flowers are in racemes and small; seed pod three-lobed, each lobe containing one seed, nearly an inch long by two-thirds of an inch thick, thus bringing it under "euphorbiacæ." The wood is soft, and when the bark is wounded a cream-colored sap or juice exudes. The Indians call this sap Caoutchouc; the Portuguese, seringa or borracha, signifying syringe or tube; the Bolivians call it goma or Rubber collectors are called seringueros, and their rubber forests seringales.

The forests in Bolivia in which the rubber tree is found are situated along the Beni and Madre de Dios rivers, where the land is higher than in Brazil. Usually they are dense, with their tops interlocking and loaded with parasites, many of which have long roots. It is not a simple affair to make a clearing for the camp.

where the yucca (mandioca plant), banana, rice and sugar cane can be planted. The locality of the camp being determined, gatherers seek a tree that leans out of the perpendicular. On the side toward which they lean the trees are cut off or nearly so, over an acre or two, and then the leaning tree is entirely cut off. The vines which bind the tops are now severed and the tree falls against the others, causing them to fall together. In a month, the tops being dry, they are fired and burn up, all but the large trunks.

The houses are now made by planting posts and tying cross poles, to which upright canes are secured by bark strips. A floor of split "chonta," or black palm trunks, and a thatch of palm leaves a foot thick complete the building. The floor is raised 3 to 8 feet above the ground, and the space beneath used as a chicken coop, pigpen or storeroom. The men now make paths to their rubber trees, so that each may have 100 to 150 trees on his path. These paths are called estradas. These estradas are often very tortuous and in many places pass through mudholes, so that the men only wear bark shirts which have the appearance of sacks upside down, with a slit cut through the center of the fold for the head and openings for the arms at the corners.

The modus operandi of the collector is as follows: Taking a cotton alforca (saddlebag) he puts into it tin cups that hold about six ounces: some clay of the consistency of putty; a small axe made by doubling an inch-wide piece of strap iron, six or seven inches long, with edges welded and sharpened, a stick is thrust through the loop thus formed. At each tree he strikes the axe into the bark and gives it a twist so as not to wound the wood of the tree, but to open the bark. The sap, which resembles rich cow's milk, now begins to run; he then presses into the bark, below the wound, a bit of soft clay, and against the clay a tin cup so that the "milk" may run into the cup. The sap begins to flow during the night and stops about 10 A. M. At each tree he takes down the cup, empties the contents into his vessel, and then replaces it to collect any sap that may flow afterwards.

After the first tapping, and before again tapping the tree, the cup is taken down and the dried juice, one-eighth to three-fourths of an inch thick, is removed from it. When a quantity is thus obtained, sufficient to fill a box one by one and one-half feet deep,

it is collected, placed in the box, and fresh "milk" poured over the loose pieces; this binds them into a solid mass as it dries. These masses are called *sernamby*, and are only second-class rubber. Having collected the "milk" from the trees of his *estrada*, it is taken to the smokehouse, where a fire is built of dry "urucury" or "uauassu" palm nuts (called in Bolivia *motacu* or *cusi*), and an earthen jar without bottom is placed over them to serve as a chimney.

The milk is now poured into a large, open receptacle—often the inverted back of a turtle—then taking a common wooden paddle, such as is used with canoes, the "milk" is poured over the blade, wetting both sides of the paddle, which is then passed through the heat and smoke a few inches above the neck of the jar, and then withdrawn and passed over again and returned. The heat and smoke coagulate the sap quickly, seldom making a second passage necessary. The paddle is now again wetted and then passed as before. When the bolacha is made, i. e., when all the "milk" is coagulated on the blade, it is placed in the sun on a rack of poles several feet above the ground. If the trees yield well, the paddle now weighs thirty to fifty pounds, and when dry, usually ten to thirty pounds. The following day, when the paddle is again wanted for use, it is taken off the drying poles, the rubber on the end cut through, and by striking the end of the handle upon the ground it is driven through the rubber. It is yet soft, and stencil impressions are made into it with the initials of the owner.

Trees treated in this manner can be tapped every day in the year; however, after five years' continuous tapping a rest of two to five years should be given them. If cultivated possibly this need not be done. Many have two or more rubber camps, and thus can give the supposed rest.

There are only two points in collecting rubber requiring strength—the long carry of the sap, and the weight of the paddle near the end of the coagulating process. As the rubber is not coagulated except with the aid of the palm nuts mentioned, the value of rubber estradas are dependent somewhat on the abundance of these nuts and nearness to place needed.

The Indians receive \$3 a month and rations. The rivers abound in fish, the forests in monkeys, wild turkeys, a few peccary

and tapirs, and, when sand bars are bare, turtle eggs and turtles. Many camps have their turtle pens; the starch of the yucca (mandioca plant) supplants flour, bananas, plantains and potatoes. With rice, bananas, yucca, fish, turkeys, one need not suffer. Communication with the stock farms now makes "jerked" meat abundant. The expenses of living are nominal, while the profits are enormous. Export duties are 20 per cent. ad valorem.

The cost of gathering rubber and placing it on the market is estimated at twenty-five cents per pound. The difficulties in taking rubber to the steamer below the Falls as San Antonio on the river Madeira, perils of the voyage, and loss of time (three to four months), makes it necessary to "work" rubber with a least thirty to fifty men, as it will require thirty men to run the falls and rapids. When transportation facilities are better, families may settle and collect the product where trees are few, for they could put in their extra time cultivating chocolate, tobacco, sugar cane and rice. The yucca starch could be made a profitable industry, for it makes splendid bread or biscuit, and when when dried becomes tapicca, or, when dried over the fire, is the farinha of Brazil. The health of rubber camps is good when proper care is taken.—Bull. Amer. Repub., December, 1897.

Tierra del Fuego. If you will examine the nautical charts of the Strait of Magellan, the waters of Tierra del Fuego, and the isthmus to the south, you will see a large area of land and water that has no parallel on this globe, a country beyond 53° south latitude, with a temperature seldom below freezing point and yet never warm. Its high mountains reach up into a frigid temperature, while their bases are continually washed by the warm waters of the Pacific, resulting in an atmosphere that is too damp to dry a cotton cloth in the open air. There are channels of water in every direction, one to three miles wide, fiords cut perpendicularly down from the summit to the water level, 3,000 to 4,000 feet, and then, below you, there are still from 10 to 300 fathoms of water. All over this section, particularly to the westward, are elevations rising to 4,000 and occasionally to 8,000 feet. There are thirty to fifty great glaciers, and all around below them the beech trees and the tropical magnolias, which are evergreens here. In some

places grass grows on decayed grass roots all the year round, and so long has this endured that there is frequently an accumulation of wet, decayed vegetable matter under these roots. You can push a bamboo pole down sixteen feet. The tidal rise and fall is forty feet at the first narrows in Magellan Strait: 60 miles farther in the tide rises from four to six feet; in the southern channels practically no tide, but a current, apparently driven by the wind. albatross, the penguin, the parrot and the canary bird live here. The barometer falls with a wind from southwest for one day and then rises with a gale from the southwest a few days later; and the same may be said for winds from every other point of the com-I had my yacht hove to, riding out a heavy gale of wind off Cape Horn Island for four days. On my return to the station, only sixty miles northward, I found that they had had continued good weather on the land, and no evidence of a gale sixty miles away from them. I can get no position on the land that the winds are not controlled in direction by the high mountains and Good observations of the clouds are generally obscured by the masts and rigging above us. I cannot take temperature by the wet and dry-bulb thermometers, for both of them are constantly wet. There are but few days when we can get the true temperature of the ocean; the surf is so tremendous that you can only catch a part of a pint of water high up on the beach.—Monthly Weather Review, November, 1897.

Uruguay. The exports of the country, with, perhaps, the exception of charque (salt dried beef) and Liebig's extract of beef, consist mainly of the raw material, such as wool, hides, sheep skins, hair and other rural products; grain also is now being exported to some extent, and may assume important proportions in the near future. Paucity of farm laborers, however, is at present the great drawback to the development of agriculture here, and, unless immigration comes to the rescue, agriculture must be retarded for some time.

The number of cattle slaughtered by the dry-salting establishments of the Republic in 1895, however, was greater than in the previous year, and reached 869,500 head. During the year 1894 the number of cattle killed for the same purpose was 846,100.

The increase must be attributed to the larger amount of liquid meat that is now being manufactured and exported. The total value of charque made during 1895 was £1,047,132, and that for the previous year was £1,216,813.—Bull. of the Bureau of American Republics, October, 1897.

The Geographical Association of Great Britain.—A few words about the origin and aims of the Geographical Association of Great Britain may be of interest to American readers of the JOURNAL. The Association has for its object the improvement of Geographical teaching in secondary schools. That there was room for improvement may be gathered from Dr. Scott Keltie's valuable "Report on the Position and Methods of Geographical Education in the United Kingdom and Abroad," written for the Council of the Royal Geographical Society in 1885. Of the secondary schools he wrote: "There is no encouragement to give Geography a prominent place in the curriculum; no provision for the training of teachers in the facts and principles of the subject, and in the best methods of teaching it; no inducement to publishers to produce maps, globes, pictures, reliefs and other apparatus of the quality and in the variety to be found on the Continent; while our ordinary text-books are, with few exceptions, unskilled compilations by men who have no special knowledge of In short, in the present condition of things it is their subject. thought that Geography, like English, can be taught by anybody." And he adds, "I have found individual masters here and there who do their best to elevate the subject above the wretched position it has hitherto occupied, but it is evident that they work under considerable discouragement and often with want of knowledge. I find them resorting to all sorts of contrivances for lack of good apparatus—making their own maps or sending to the Continent for good maps in dissatisfaction with those procurable in this country."

It is obvious that such isolated experiments must involve a serious waste of time and trouble; and accordingly, some years ago, Mr. B. Bentham Dickinson, of Rugby, himself an enthusiastic believer in the educational capabilities of Geography, invited a few friends who were interested in the subject to combine their

efforts, with the object of supplying themselves with better appliances and making known the best methods of teaching. also hoped that some influence might be brought to bear on certain bodies that conduct public examinations, such as the Civil Service Commissioners and the universities, in order to secure that the papers they set should guide and stimulate the teaching of Geography in the schools and discourage unintelligent "cramming." The movement received from the first the sympathy and encouragement of the Council of the Royal Geographical Society, and a meeting was held at Oxford in May, 1893, at which the Geographical Association was definitely formed. Among the conveners were Mr. Douglas W. Freshfield, now Secretary of the Royal Geographical Society, and Mr. H. J. Mackinder, Reader in Geography at Oxford. At the present time the Association numbers about 80 members and is represented in about 50 schools, including nearly all the great public schools. And here it may be well to remind American readers that in England the term "public schools" is applied to an indefinite number of the higher secondary schools, including the famous old foundations of Winchester, Eton, Harrow and Rugby, as well as newer schools, such as Marlborough and Haileybury. And it is with secondary schools that the Association concerns itself (including high schools for girls), as distinguished from the primary or elementary schools.

The objects of the Association having been thus broadly indicated, readers must be referred for details to the annual reports. It may however be added that a considerable measure of success has attended the efforts of the Committee during the last four years. The opinions of headmasters on the question of reforms in examinations in Geography have been collected, and a memorial to boards of examiners has been published which has already borne some fruit and will bear more. The Association's collection of lantern slides (maps, diagrams and scenery) will soon number a thousand, and a series of hand-maps is being published, specially prepared on lines approved by the Committee. The question of a syllabus is also under consideration; and much is hoped from the scheme now set on foot for coöperating with the JOURNAL OF SCHOOL GEOGRAPHY, which, when adapted to British requirements by the inclusion of notes and articles of special interest to British teach-

ers, will supply a want that has been felt for some time past. In a word, progress has been made, and things are better in 1898 than they were when Dr. Scott Keltie wrote his report in 1885.

A. J. H.

Use of Wheat in China.—Although rice is generally regarded by the Chinese as the "staff of life," a large quantity of wheat has been used from the most ancient times, and in the earliest classifications, wheat is mentioned as one of the five grains. In the northern provinces, where rice is not grown and can only be purchased by the well to do, wheat is the most common cereal, but it is of a very poor quality.

The wheat is ground by a very primitive process. The mill consists of two light stones, which are turned by aid of a blind-folded mule. The flour is coarse and dark, chiefly used in the form of vermicelli, and, when steamed, makes a good substitute for rice, and when mixed with a little broth, flavored with a dash of soy, it forms a very savory dish. To use the Chinese term, they are the "suspended" and the "dropped;" the former is the true vermicelli, the manufacture of which is a common sight in many northern villages, where strings of the paste fastened at the end of two light sticks, are suspended before the doors of the cottages even in the main streets. The strings are generally lengthened by pulling down "little by little" the lower stick, a dozen or twenty strings being fastened to each pair of sticks. The chopped vermicelli is made by rolling out the dough and cutting it in thin strips with a knife fastened to the board like a straw chopper.

Wheat flour is also used for making rolls which are lightened with leaven, and these are cooked by steaming, as are the many varieties of patties containing minced meat, molasses, or a kind of jam. The steamer consists of sieves, fitting tightly one upon another, which are covered and placed over the kettle in which the meat or other food is being cooked.

The ordinary Chinese, whether in city or village, takes his breakfast at the tea house or restaurant. It consists almost entirely of these meat rolls or patties; the latter are dipped in vinegar, soy, or a solution of red pepper, when eaten. Sometimes the steamed rolls, after they have grown old, are made palatable by being

toasted on a grill over a charcoal fire. Another popular dish is doughnut fried in oil. Baking is almost entirely unknown, but there is a cake of the size and shape of an ox rib which is baked by being stuck on the inside of a jar-shaped furnace, in which there is a hot charcoal fire. These cakes are sometimes circular. but in every case they are covered with the seeds of the sesame, which add very much to the flavor. Another variety is a large, round cake cooked on a griddle, and which is divided into quarters when offered for sale. The Mohammedan Chinese make a similar cake, of which they are also very fond, without using any pork fat.—Consular Reports, December, 1897.

Globe Lessons.—In almost all towns will be found a planing mill, where balls may be turned. A pine ball, about four inches in diameter, may be procured for something like ten cents, and each pupil should have one. Have two small tacks placed to represent the north and south poles. With the aid of a compass, or a string tied to one of the poles, the equator may be drawn, and, under the teacher's development, any pupil will be able, after drawing this circle, to give the definition of the equator, without consulting a geography. Then have one meridian circle drawn, developing the definitions of meridian circle and meridian.

In their arithmetic work, sixth grade pupils have learned that 360 degrees make one circumference. They are told that latitude is distance north or south of the equator, and can easily see that the poles are at 90 degrees north and south latitude. For convenience in future map drawing, parallels of latitude, small circles, should be drawn, fifteen degrees apart, and marked on the prime meridian. All points regarding latitude may be developed in this lesson. It is not wise, however, to undertake too much in one lesson, for the pupil's work will not be accurate, nor will they remember as well. In another lesson the zones may be marked.

Meridian circles, fifteen degrees apart, should next be drawn and marked as in the diagram. When the pupils have been trained to tell the latitude and longitude of various places on their flat maps, the maps of the continents may be copied, from their geographies, upon their globes. Great care is necessary that this may be well done. It is well to begin with South America, as it has an easy coast line. The lesson may be conducted as follows:

Let the pupils discover that Panama is in north latitude 9 degrees and longitude 80 degrees west. Make a dot at that point on the balls. Find the latitude and longitude of Port Gallinas, draw the coast lines between these points. At west longitude 50 degrees, on the equator, mark the Orinoco river; draw to that point, and so on, until the continent is completed. So each continent may be placed. This certainly is excellent training in understanding latitude and longitude.

From the balls, when completed, maps may be made with profit, for this will teach the pupils to read correctly the maps in their geographies. After this has been done, some of the children who have grown especially interested in their work will wish to color the oceans blue and to mark the continents with other colors. This may be done in water colors at home, if the teacher does not wish all to do it. The writer has had pupils, who owned scroll-saws, mount the globes on standards, showing correctly the inclination of the earth.—Teachers' Institute, June, 1897.

Mean Sea Level. Physical Geography is much concerned with reference to Mean Sea Level, yet it is not generally realized how indefinite a thing this is. The only means of determining it at any place is by continuous tidal observations on a staff connected by accurate levelling with a well determined bench-mark.

The observations must be made not merely day and night, but throughout the year. At Washington, D. C., Mean Sea Level in June is 16 inches above Mean Sea Level of March. (U. S. Tide Tubles, 1898, p. 432.)

Mean Sea Level at Calcutta on September 1 is five and a half feet higher than on April 1, thanks to the Monsoons that push the waters steadily up toward the head of the Bay in the summer months, and down during the winter. So, too, every wind that blows has its effect on Mean Sea Level. In the Gulf of Mexico and the Carolina Sounds the winds outweigh the tides in determining the height of water.

Accurate levellings and tidal observations all about the coasts of Ireland show that "the mean height of the sea round the northern half of the island is considerably greater than that round the southern half." Airy in Philos. Trans., 1845, p. 96. So the

Mean Sea Level in Bristol Channel is higher than in the English Channel.

Further, it is demonstrated that Mean Sea Level as determined from Spring Tides is higher than that determined from Neaps. (Airy.)

Ferrel finds from analysis that the "sea level as obtained from tidal observations where the water is shallow is generally higher than that obtained where the water is deeper." (*Tidal Researches* p. 137.) That should mean that the Mean Sea Level on the Atlantic coast of America is higher than on the Pacific coast, but the quantities are very small.

Mean Low Water, on the contrary, stands at heights differing in different places by many feet.

M. S. W. J.

Surface Currents of the North Sea. (1) There is at all seasons a fairly constant, slow circulation of the surface water in the North Sea, Atlantic water entering round the north of Scotland and between the Orkneys and Shetlands, and passing southwards along the east coasts of Scotland and England, as far as the neighborhood of the Wash, then in an E.N.E. direction towards the coast of Denmark, and then northerly along the Danish coast. The surface water may or may not enter the Skager-Rak and penetrate to the west coast of Sweden and the south coast of Norway. The main body passes up the west coast of Norway and joins the Atlantic stream. The limit between the north-going eastern stream and the south-going western stream varies greatly, probably according to the prevailing winds; as a rule, the extent of the former is greater. (2) The movements of the surface water in confined areas, like the western part of the Moray Firth and the Firth of Forth, is irregular, and depends upon variations in the winds and the (3) While the general circulation of the surface water in the North Sea is as above described, the current may be deflected by the wind, or even, under exceptional meteorological conditions. reversed. (4) The speed of the movement is usually about two or three geographical miles a day, but may be much accelerated or retarded by the action of the wind. (5) The principal cause of the circulation is probably the influence of the prevailing winds, driving the water towards the eastern side and tending to heap it there.—Scot. Geog. May., December, 1897.

To the Editor of the Journal of School Geography:

Prof. Davis is quite correct in calling the great depression or pit in which Crater Lake lies a *Caldera*. My brief article in this Journal (November, 1897) concerning that wonderful feature should have contained a reference to my other more extensive papers (*National Geographic Magazine*, February, 1897, and *American Journal of Science*, March, 1897), in both of which the term Caldera is used.

The Caldera containing Crater Lake is probably the best example of its kind in the world, and is strongly contrasted in many ways with the typical crater in the summit of the cinder cone on Wizard Island. To have called them both craters without qualification, would have been a serious mistake indeed, but to designate the one a crater and the other the pit, is to apply not only the simplest terms but to use those commonly employed by both geologists and tourists upon the ground. Had my theme been more of volcanoes and less of lakes, the comparison of crater and caldera would have been included.

J. S. DILLER.

Preparation for Geography Teaching. Professor E. C. Branson, of Georgia State Normal School, very truthfully says, "That getting ready to teach geography is a lifetime work, and furnishes the common school teacher opportunity for the most liberal self culture. Southern Ed. Journal, October, 1897.

First Steps in Geography.—Superintendent Logan D. Howell has recently published some sensible and much needed advice regarding the teaching of geography to elementary classes, from which the following paragraphs are taken: A child's knowledge of the world begins with what he can see of it. For a number of years he believes the earth is bounded by the horizon. Now, shall we in teaching ignore this fancy of the child and teach him the truth at once about the spherical shape of the world, the oceans, and continents with their mountains and rivers, and the World Ridge like a big horse-shoe nailed on to it all? We do this in no other study. The actual shape of the world determines how we shall direct our

teaching, but it has nothing to do with how we shall begin it. That is determined by the contents of the mind of the beginner. And it is a fact of his experience that the earth is generally flat, with some slopes in places, and more or less hills, according to where each child lives. To begin the teaching of geography with a globe takes the child immediately away from all his experiences, and is the most violent sort of arbitrary instructing by authority, instead of by reason. To use flat maps, representing large portions of a sphere is worse; for, in addition to being an outrage upon the child's reason, it requires an impossible effort of imagination for a beginner to think of two circles as being opposite sides of a sphere, or to understand at all a Mercator's projection. Much irrational teaching has got into our schools through a desire on our part of giving children the greatest possible amount of useful knowledge during the short while they are with us. We forget that knowledge cannot be imparted to children, but is built up by experience. We teach children to repeat words and to point out lines and dots on maps, and think we are educating them in useful knowledge. But it is not the business of schools to finish the education of children. Education is a life-long business, and school life is only The purpose of our teaching should be not only the a part of it. acquisition of useful knowledge, but the acquisition of good mental habits and the love of learning. The most useful knowledge our pupils can acquire under us is the knowledge of how to study. In teaching geography, then, let us teach whatever we have time to teach of it, in accordance with the principles we profess to believe, so that if any children do not complete our course they will go

NOTES.

from us with a good foundation to build upon, that will stand them in better stead than a lot of unrelated items of information about a world of which they have no proper conception. The beginner in geography should learn first the country he is familiar with. This may seem a paradox; but a child under the guidance of a teacher will learn much about his familiar haunts that has hitherto escaped his notice. He has never thought of its drainage, he cannot describe its soil, he has never noticed a difference between hillside and valley, he has no conception of the work done by the streams of his neighborhood. Of course, he has no idea of mean

annual temperature, of the measurement of rainfall. If the child lives in town he has very vague notions of what the farmers in his locality are engaged in, and he does not know the chief business of his own town. His idea of government is typified in the policeman. Now, before trying to teach the child the whole world through his imagination, is it not necessary for him to form definite ideas about the things he can see, and investigate for himself? A course in geography should begin with a child's experience, and build up on that.—Morning Post, Raleigh, N. C., Jan. 2, 1898.

REVIEWS.

The World and Its People.—A Series of Geographical Readers; Edited by LARKIN DUNTON. Vol. VIII. Australia and the Islands of the Sea, by EVA M. KELLOGG. Silver, Burdett & Co., 1897.

The most recent and final volume of the series of geographical readers published by Silver, Burdett & Co., considers Australia and all the more important islands of the world. So many unrelated parts of the earth are here brought together for the sake of of completing a task, that the book appears fragmentary and lacking in logical order. The islands of the sea are neither considered in a geographical sequence or in accordance with their economic importance, so that the book appears like more of a catch-all than is really necessary.

The descriptions are in general interesting and good, particularly of those parts of the world that have recently been brought prominently into public notice. There are certain omissions or inadequacies that are to be regretted. For instance, Australia is such a splendid unit for illustrating control of climate by topographic features and relation to the general winds that it is unfortunate that the points were not brought out more fully. We commend the emphasis given to the fact, almost always erroneously given, that the coral builders are not insects.

There are some inaccuracies that are especially noticeable. The statement, on p. 117, that in the southern part of Iceland the average temperature "for the winter is minus twenty-nine" does not

correspond with the ideas given in all the best isothermal maps for January in our atlases.

The typography is good and pleasing to the eye; the illustrations are good when taken from photographs, but are in many cases ideal and unnatural. On the whole, the book contains much information of a readable kind concerning many little known but important parts of the world. It is not, however, up to the standard of the rest of the series, of which notice has been made on p. 39, of Vol. II.

R. E. D.

Volcanoes of North America. I. C. Russell. The Macmillan Co., 1897.

Previous mention has been made in this Journal (p. 192, Vol. I), of the volume on the Glaciers of North America, by Professor I. C. Russell. We are now very glad to mention the latest volume of monographs by this well known writer—that on the Volcanoes of North America. The book is a large and very attractive one, unfortunately somewhat high priced, and hence not within the limits of the average common school teacher. It is, however, a book full of fact and illustration that any live teacher will be delighted to have at hand for reference.

The chapters on the Characteristics of Volcanoes, Volcanoes of Central America, of Mexico, of the United States, and the chapter entitled A Life History of a Volcano, are the most valuable for general readers and teachers. The first chapter gives a better idea of the features presented by volcanic features of all kinds than any summary we know. It has been in part culled from the best sources of reference, and is in part based on the author's personal knowledge. The method of treatment and many of the ideas will be new to many teachers and yet most helpful. The chapter on the Volcanoes of the United States is full of helpful illustration and information that should be welcomed by any teacher who is anxious to get the best regarding her own country.

Many of the illustrations in the book are of phenomena of general interest, not hitherto chosen for illustration in our books for teachers. The process chosen has usually given good results and hence the value of the reproductions.

The book should be in every good library, and should be ranked among the "fifty best books of the year" for a general village library.

R. E. D.

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THE

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ANNOUNCEMENT.

With this number Professor F. M. McMurry retires from the board of editors, and Mr. N. M. Fenneman, of the Department of Physical Science, State Normal School, Greeley, Colorado, takes his place. Professor McMurry has not resigned because of lack of interest in the JOURNAL, for his coöperation will be much more active in the future; but because he is to be a colleague of the Editor on the Faculty of the Teachers College of Columbia University, New York City, after the close of the present academic year, and it has seemed best not to have the Associate Editors represent too narrow a field geographically or educationally. welcome Mr. Fenneman with a great deal of pleasure, because of the strength that he will bring to us. He has had a long and thorough geographical training as student, and experience as teacher, and is especially qualified to deal with many topics hitherto neglected in our columns. He also represents an important region of our country thus far unrepresented, where geographic advance in teaching has been rapid and of a high order. Notes from his pen may be expected in an early issue.

WAVES AND TIDES.

The following outline of the related subjects of waves and tides is submitted as appropriate for a well-trained class in the later years of a good high school course. It is believed that physiography, when treated throughout in a manner equivalent to that indicated in these two chapters of the subject, should be accepted by colleges as a worthy member of their alternative admission requirements. Its informational and disciplinary values should be rated as high as those of any other subject, time for time.

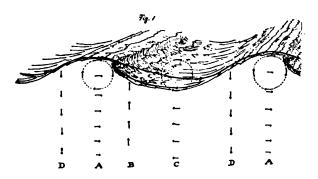
Winds blowing over a water surface set it into undulating motion. The water oscillates up and down, forward and backward, over small distances, while the undulating form or wave moves forward in direction of the wind, but with less velocity. This may be illustrated by experiment.

The top of a wave is its crest; the bottom is the trough. The crest and trough lines lie at right angles to the wind. The rising part of the wave is its front; the falling part is its back. The sum of the height of the crest above mean water level and of the depth of the trough below it is called the "height" of the wave. The length of the wave is not measured along its crest, but from crest to crest across a trough. The velocity of the wave is the speed with which any part of its form, as its crest, travels forward. The period of a wave is the time interval between the arrival of successive crests or troughs. All these terms may be based on experimental illustration.

As the wind increases in strength, the waves increase in size and velocity. When they reach a height of a foot or more, the oscillating movement of the water in the waves is easily seen to be arranged as in Fig. 1. A cloth or paper immersed a little below the water surface exhibits the motions very clearly. Imagine the water to be traversed by a series of vertical planes parallel to the crest lines. All the particles in the crest plane are moving forward; in the trough plane, backward; on the front, upward; on the back, downward. All this may be seen on a pond during a brisk wind.

A forward movement of the wave necessarily results from these

systematic movements of the water. The water surface must rise and soon reach crest height on the water front, because all the water in the front plane is rising, and this water must rise because it stands between the crest and trough planes in which the water movements are approaching each other. Similar explanation applies to the falling back of the wave.



When the wave crest reaches plane B, the water there will have gained the forward motion appropriate to a crest plane. The motion in the other planes will have correspondingly changed. The water at any one point moves successively in the directions of the arrows in the several planes; hence it moves regularly around an orbit whose height equals the height of the wave. The period of time required for a circuit of the orbit equals the wave period. The dimensions of the orbits diminish downward. In wind-driven waves, the orbital paths at the surface do not precisely close, the forward movement in the crest being greater than the backward movement in the trough; thus a forward drift of the surface water is established; and in this way waves are related to currents.

The forward velocity of the wave is much greater than that of the forward movement of the water in the crest plane. The wave velocity does not depend so much on the orbital velocity as on the rate at which the crest position is assumed by successive parts of the water, and this rate depends chiefly on the depth to which the orbital oscillations are felt in the water body. The larger the wave, the greater the depth affected, and the faster the progress of the wave.

The wind works on large waves by making ripples and small

waves upon them; thus gaining a better catch on their surface, and enlarging and accelerating the orbital movement. This is true not only for the main wind blowing over the crest, but for a wind eddy that brushes backward in the trough. As the waves increase under gales and hurricanes, they are called "seas."

When waves gain a high crest, it is relatively sharp edged between steep slopes. The crest water then tends to roll forward faster than the front is built up; and this tendency is increased by the forward brushing of the wind. Sharp waves of moderate height break in "white caps;" great seas gain curling or combing crests, which capsize small boats and break with dangerous force on the decks of large vessels.

Waves increase in size until the resistances awakened by the orbital movements through the whole depth affected equal the action of the wind at the surface. Then the waves can grow no larger. Waves in hurricanes gain a height of thirty or forty feet, or a little more; a height of fifty feet has not been authentically reported. Their length may then be 500 to 1,500 feet; their period 10 to 20 seconds; and their velocity 20 to 60 miles an hour. It is truly fortunate that the water does not move with the waves, for if it did, the oceans would not be navigable. When the orbital movement reaches a significant measure on the bottom in shallow water, the resistances increase rapidly and the waves cannot grow to great size. Hence a gale of a given strength cannot make waves so large near shore as out in the deep ocean.

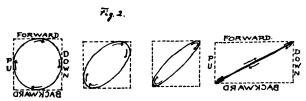
If a little oil be poured on the sea, it quickly spreads, even to leeward, and forms a "slick" where the wind cannot catch so well on the water. The force of the wind cannot then be so well applied to working the waves as before; they cease combing and are shorn of their greater dangers. A number of curious accounts of the "Use of Oil at Sea" may be found in a pamphlet on that subject published by the United States Hydrographic Office, Washington, D. C.

Waves spread rapidly away from the gales in which they are formed. As they advance, they decrease in height, but retain length, velocity and period unchanged. Their long, flat undulation is then called "swell." It may swing for thousands of miles across the ocean, fading as it goes. The glassy water of calm

weather in the equatorial "doldrums" is always slowly heaving and sinking with passing swells.

When waves run into shoaling water, their period remains unchanged, their height increases, and their velocity and length decrease. The height increases because the wave energy at any given point is spent upon a lessening depth of water. The velocity decreases because the forward propagation of wave disturbance is slower in shallow than in deep water. The wave length decreases, because the forward waves are more retarded than the following waves. The period is unchanged because, at any given point, one wave is as much delayed in arrival as another. Many of these facts may be observed near the shore of a pond on a windy day.

On a steep-sloping beach, the waves may wash up and down without breaking; then the orbit is a narrow ellipse, much inclined forward; directly on the beach, the orbit is practically a line coincident with the slope of the beach; and here the water rises as it advances, and falls as it recedes. This relation of rise and fall to forward and backward motion is not found where the orbit is an oval. If the orbit is a vertical ellipse, rise goes with the last half of recession and the first half of advance; fall goes with the last half of advance and the first half of recession. This is easily illustrated by the "square frames" fitted to several forms of orbit in Fig. 2.

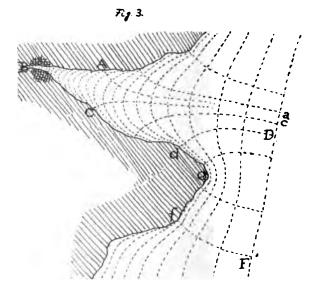


On a gradually shoaling bottom, swell changes to surf or breakers close to shore. The height of the wave increases, its front becomes steeper than its back, its crest curls forward and at last plunges into the trough ahead of it, splashing and surging up the beach. Just at the time of breaking, the water may be seen ascending in the concave front of the wave and curling forward at the crest. Breaking is therefore the result of normal orbital movement at a place where the water is so shallow that there is not enough of it to build up the front of the wave. This explana-

tion, suggested by Hagen, is much more satisfactory than the usual explanation which refers the breaking of surf to friction on the bottom.

Vessels at ports on exposed coasts, like Madras, may experience much difficulty in sending their boats ashore, even in fair weather: for the swell from distant storms is converted into breakers or rollers close to the beach, that can be passed only with difficulty and danger. The increase of the surf on such a coast is taken as the sign of an approaching storm. Landing in the harbor of St. Helena is sometimes impossible, on account of surf from swell that originates in winter gales in the North Atlantic, thousands of of miles away.

During an on-shore wind, the surface waters acquire a drift towards the land, and as a result there is an outflowing current produced at the bottom. This is known at the "undertow." The surface drift is stronger when the wind acts on the surf than on smooth water; hence the common association of these two elements.

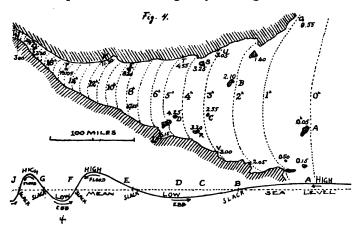


The decrease in the velocity of waves as they advance into shoaling water causes the crest line to become more and more nearly parallel to the shore line. A curious effect of this is seen in the concentration of the energy from a considerable crest line upon a

narrow headland, thus increasing its dangers, as is shown in Fig. 3. A bay-head receives its waves from a much less measure of crest line than the bay-breadth; thus the waves are much weakened and the safety of the harbor at the bay-head is increased.

Slow oscillations of the ocean near and on shore in a period of 12 h., 26 m. are known as the tides. The rise and fall of the surface is associated with landward and seaward movements of moderate velocity, known as flood and ebb currents. Observations of tides should distinguish the time of high water and low water, and the change of level or tidal range between the two; the strength and direction of flood and ebb currents; and the time of no current or slack water between flood and ebb and between ebb and flood.

The following map and table illustrate many of the more important tidal phenomena in a large bay heading in a narrow estuary



The data are shorn of all complex irregularities. The time of high tide is given on the map, Fig. 4, for a number of places not included in the table. For class use, the map (without the dotted curves) and the table should be copied on the blackboard. The following conclusions may be drawn from their study.

The table shows that the interval between successive high tides is 12 h., 25 m., wherever observed.

Dotted lines may be drawn upon the map to represent the inferred position of places having high tide on the even hours. These lines should be located with due regard to the times of high tide on the map. For example, in the middle of the bay, high tide is recorded at various times between two and five o'clock at a number of stations. At three o'clock, high water presumably occurs a little further up the bay than C, not quite so far up as U and V, and distinctly not so far up as U and U. A dotted line connecting the three-o'clock high waters must be a curve convex up the bay. Similar lines for other hours may then be drawn, harmonizing with all the data. It thus appears, even more manifestly than before, that the condition of high tide occurs at later and later hours up the bay. Moreover, the rate of advance of high tide is greatest at the mouth of the bay, and is more and more retarded at the bay head and in the estuary. High tide passes U at the rate of about 70 miles an hour; U miles an hour.

STATION.	HIGH WATER,	RISE.	CURRENT.	SLACK WATER.	LOW WATER.	FALL	CURRENT.	SLACK WATER.	HIGH REF.
A B C D E	2.10 2.55 4.25 8.30	2 ft. 3 " 3 " 4 " 5 "	←2:3" ←3:3" ←2:3"	5.15 6.10 8.05 12.35	6.20 8.25 9.10 11.50 16.40	2 ft. 3 " 4 " 5 "	⇒3" ⇒>3" ⇒>3"	11.25 12.20 14.20 18.50	12.30 2 ft. 14.35 3 " 15.20 3 "
G J	22.20 4.00	6 "4	< ± 5 " ← ± 3 · '	3.10 8.20	7.55 12.45	6 " 4 "	±→5" =→3"	9.20 14.35	10.45 6 " 16.25 4 "

The tidal range increases from four feet at A to twelve feet at F and G, and then decreases to eight feet at J. The greatest range known is 53 feet at the head of the Bay of Fundy. The reputed 70-foot tide in the Bay of Fundy is not verified by recent observations.

At A low water occurs at half interval between high water. At the bay-head stations, low water occurs nearer the following than the preceding high water, and the rise of the tide is accomplished more quickly than the fall. In some estuaries, the duration of rise is to the duration of fall as one is to ten or twenty. Such tides advance as visible walls of water, foaming and rushing up stream with a speed of ten or more miles an hour; they are called "bores," and are well developed in the estuaries of the Bay of Fundy, in the Severn estuary of Bristol channel, and elsewhere.

The relation of flood and ebb currents to high and low water is of peculiar interest. At A, the flood begins three hours before high water, attains its greatest velocity at high water, and ceases three hours later. Ebb is similarly related to low water. Slack water occurs at mid-interval between high and low tides. A less symmetrical relation prevails further up the bay, until finally at the head of small bays, like L, or on shores where the tide comes on broadside, like K, slack water agrees with high and low tides; all the rising tide has a flood current, and all the falling tide, an ebb current. It is the latter relation that is commonly understood to prevail in all tides; but it is really exceptional, and does not characterize the tide till it reaches the very shore, and not then if the tide progresses obliquely along the shore line.

All these peculiarities of rise and fall, flood and ebb, range, velocity, and period can be easily understood when it is recognized that the tide is a long, flat swell, coming ashore from the open ocean, and suffering such modifications on reaching shoal water as have already been explained in the case of waves. The tidal currents are thus seen to be simply the orbital movement of the water in the tidal wave.* High tide is the crest of the tidal wave; then the flood current moves in the direction of wave advance. Low tide is the trough of the tidal wave; then the ebb current moves backward. The wave orbit at the bay mouth is a very flat ellipse, about five miles long and four feet high. Slack water occurs at the mid-front or mid-back of the wave, when the orbital movement is upward or downward, without landward or seaward motion.

The length of the wave at the bay mouth is about 200 miles; at the bay head, about 70 miles, as shown in section at the bottom of Fig. 4. The variation in velocity of progress has already been mentioned. The faster rise and fall in the estuary, and the abrupt rush of the tidal bore in extreme cases are like the steepening and plunging wave-front in surf. At L and K the behavior of the tide resembles that of waves on an inclined beach, where advance and rise, recession and fall go together.

If the experience of others is like my own, it will not be too

^{*}The ordinary use of the term, tidal wave, as a name for an earthquake wave is an unfortunate and pernicious misnomer.

much to say that all the phenomena of tides on oceanic shores are much simplified by the careful development of their analogy with waves.

When the origin of tides is considered, it is manifest that the shore tidal waves are the effect of tidal waves in the open ocean, although tides are there entirely imperceptible to observation. The length and velocity of the tidal wave far off-shore must be greater than at the mouth of a bay; the range must be less; the period only remains constant. Whatever length, velocity and height the tidal-wave has in mid-ocean its period must be close to 12 h., 26 m., and by this element its cause must be searched for. Some periodic force, perpetually acting at intervals of 12 h., 26 m., must be responsible for the oscillation of the tides on continental shores.

Half the interval between successive transits of the moon over a meridian is 12 h., 26 m. Hence it is probable that tides are caused by some action of lunar gravitation. This expectation is fully verified by the following considerations, which may be presented as a good illustration of deductive study, based on previously acquired knowledge, and appropriately extended to meet the case in hand.

The earth is (in round numbers) 8,000 miles in diameter. The moon is 2,000 miles in diameter. The distance from earth to moon is 240,000 miles, or 60 earth radii. The mass of the moon is about 1 80 of the earth's mass.

The centre of gravity of the two bodies will be at C, 80 times further from M than from E. About this centre the two bodies revolve once a month, as shown by curved arrows, the plane of the paper representing the plane of their orbits. The earth runs around a small circle, of radius CE. The moon runs around a larger circle, of radius CM. The earth and the moon are always on opposite sides of C.

The earth acts like a solid body. Hence it must all move as its centre, E, moves. E is constantly pulled out of a straight path into the curve of its monthly orbit by the attraction of the moon, EF. The resistance that it opposes to this change of direction or its centrifugal force, is EG. EF and EG must be equal; otherwise there would be an increase or decrease in the distance,

EM, which is not the case. (The historical constancy of the moon's angular diameter suffices here to prove the historical constancy of the distance from earth to moon.)

Now, consider the relation of attraction and centrifugal force at A and at B. At A lunar attraction will be a little greater than at E; at B, a little less. The centrifugal force is the same at the three points, E, A, B (see appendix). As a consequence of these relations, there must be small unbalanced forces at A and B, acting outward from E at both places, on the line EM.

Thus far, the diurnal rotation of the earth has not been taken into account. Let the small unbalanced forces at A and B be imagined to reside on an immaterial shell, within which the world rotates. Then, in consequence of the earth's rotation, any point on the earth's equator, ADBH, must pass under an unbalanced outward force every twelve hours and twenty-six minutes; it is in effect to these forces that the tides are due. High tide will not occur at the moment when the forces at A and B are felt, but at some other moment not here considered. The essence of this simple explanation is that a single moon, moving around the earth in its well-known orbit, must tend to produce periodic movements in the ocean at intervals of 12^h 26^m . Hence the tides observed on the ocean shores may be reasonably ascribed to the moon.

A simple computation will show that the value of lunar attraction at E is 1/288,000 of terrestrial gravity. Lunar attractions at A and B are $(60/59)^2$ and $(60/61)^2$ of lunar attraction at E. The value of the unbalanced tide-making forces at A and B can be determined from these data by a little arithmetical work.

It should be noted that, in the above explanation of the tides, it is precisely as easy to understand the tide-making force at B as at A; and there need, therefore, be no trouble about "that tide on the other side of the earth from the moon." It should also be understood that there is nothing whatever original in all this, except the way of putting it. Much fuller discussions of waves and tides may be found in mathematical works, but it takes a good deal of grubbing to get at their meaning, and a good deal of effort to reduce them to comparatively elementary form.

Lack of space prevents mention of the action of tides and waves on the shore and bottom; topics deserving of careful treat-.

ment in a course on physiography in so far as they effect geographic form on the one hand, and man's way of doing things on the other.

Appendix.—The only real difficulty or obscurity in the above explanation concerns the constant value of centrifugal force at A, E, and B. This can be entirely removed if, in a preceding or parallel course on physics, the difference of centrifugal force in angular and in translatory rotation be explained. In angular rotation, as of a wheel, the centrifugal force varies in strength on any radius, and in direction on any ring. It is not alike at any two points in a plane at right angles to the axis.

In translatory rotation, a body always faces one way while going around a centre. In this case, every point describes a circle of the same size as that described by any other; and at any one moment all points are moving in the same direction and with the same velocity. Hence all points have the same centrifugal force. It is by translatory rotation that the earth moves once a month around C, and while thus carried around, it is turning on its own axis once a day.

When the teaching of geography is as good as the teaching of physics and history is coming to be, and as good as the teaching of classics and mathematics is already, then this small matter of translatory rotation will be duly attended to, and high school pupils may get a worthy knowledge of the elements of the tides. Indeed, at the present rate of advance in teaching geography, it seems quite likely that the diurnal inequality of the tides will be taught in schools in a score of years, as a beautiful application of solid geometry.

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ACONCAGUA AND MOUNT ST. ELIAS.

It is not a little remarkable that two of the loftiest mountains of the New World, separated by a distance of more than 6,000 miles, were ascended for the first time in 1897, and in both cases by Italians. A short account of the two expeditions may be of

interest; the reader can develop for himself the contrast suggested by the very different climatic conditions under which the two bands of explorers worked.

To speak first of Aconcagua. At least two scientific expeditions had visited the district before Mr. FitzGerald's in 1897. In 1883 Dr. Paul Güssfeldt explored and mapped the country north of Aconcagua, and accompanied only by two Chilians ascended to a height of over 21,000 feet. He also fixed the height of the mountain by careful trigonometrical measurement at 22,868 feet, and in his book Reise in den Andes von Chile und Argentinien, (Berlin, 1888), will be found many admirable photographs which give a very good idea of the dreary scenery of this part of the Andes and of Aconcagua itself. In 1895 Habel explored and mapped the valleys to the south of the great mountain, and the large series of photographs reproduced in colletype in his Ansichten aus Sudamerika (Berlin, 1897), are of great interest. But his work was cut short by the Argentine authorities who were at the time engaged in a dispute with Chile regarding the position of the frontier.

To reach the immediate neighborhood of Aconcagua is a matter of no great difficulty, for the present terminus of the railway that is intended to connect Buenos Ayres with Valparaiso is at Punta de las Vacas, 8,000 feet above sea level and only some twenty miles south of the mountain. Mules and horses are procurable, and the natives are accustomed to cross the ranges by passes of 11,000 to 13,000 feet. Mr. FitzGerald's well-equipped expedition reached this place in December, 1896, and for the next six weeks they fixed their base of operations 12 miles further up the valley.

As to climate, Aconcagua stands in Lat. 32° S., within 100 miles of the Pacific. Northern Chile, like southern California and for similar reasons, is rainless and barren; southern Chile, like British Columbia and the southern coast line of Alaska, is drenched with moisture by the great currents of westerly winds from the ocean. Aconcagua is in the intermediate region of moderate precipitation. The glaciers are of moderate extent, not descending, it would seem, below 11,000 feet, their lower portions so buried with moraine matter that it is often difficult to tell how far the ice actually extends. This is due to the rapid disintegration

of the rocks. The mountain slopes are covered with masses of débris (well shown in Habel's photographs), which adds not a little to the labor of ascending, since you slip back two feet in every three you step. Moreover, clouds of dust raised by the violent winds often obscure the view, and add greatly to the difficulty of breathing. A notable feature is the "Nieve penitente." The field of snow or ice is often covered with jagged pinnacles, set close together, of the height of a man or more. The name is due to the resemblance they bear to white-robed figures. this formation has been reported from any mountain region except from the Popocatepetl,* and it would seem to be due to the combined action of the sun and wind under conditions that have not yet been satisfactorily explained. Some striking photographs of "Nieve penitente" are given in Dr. Güssfeldt's book. On the upper slope of Aconcagua itself in summer the snow only lies in patches, for, owing to the extreme violence and persistence of the winds, the moderate amount that falls is evaporated or swept away. These winds are the chief danger to which the explorer is exposed. For fourteen days Mr. FitzGerald lived in a small tent on the northwest side of the mountain at a height of 19,000 feet, in intense cold, and with a gale blowing "like Niagara" (to quote from his companion's journal). On January 14th he reached a height of 22,000 feet, and was then compelled to turn back by extreme mountain sickness, extreme weakness and nausea. But he sent on his Alpine guide, Zurbruggen, who reached the summit alone two hours later. On a subsequent occasion, Mr. Stuart Vines, the geologist of the party, spent an hour on the top with an Italian porter. It was measured and found to be a plateau seventy yards square. The rock is porphyritic, and there is nothing to suggest that the peak is of volcanic origin. As the sun sank in the west the scene was indescribably magnificent, the ocean appearing like a lake of fire. For a fuller account of Mr. FitzGerald's expedition and its scientific results, we must wait for the appearance of his book. Provisionally, he fixes the height of the mountain at a trifle over 23,000 feet.

Very different were the experiences of the expedition led by

^{*} Journal of the Royal Geographical Society, Vol. VIII., p. 142. London, 1896.

Prince Luigi Amedeo of Savoy to Alaska. Situated in Lat. 60° N., within fifty miles of the Pacific, in a region of excessive precipitation, Mount St. Elias is surrounded by glaciers that are only surpassed in magnitude by those of Greenland and the Antarctic; and as they descend almost to sea level, the explorer's difficulties begin as soon as he has accomplished his perilous landing on that surfbeaten coast. And the chief difficulty is the organization of transport, for all supplies must be dragged on sledges or "packed" on men's backs across fifty miles of glaciers covered with soft snow, while the constant detours to avoid crevasses and other obstacles, double or treble the distance. This was the difficulty that had baffled four previous expeditions, American or English, and an excellent account of the expedition in 1888, with beautiful illustrations will be found in Scribner's Magazine for April, 1889, lately reprinted in a volume with other accounts of mountain adventure. The following short notes regarding the expedition of 1897 are taken from the Revista Mensile, of the Italian Alpine Club for November, 1897.

Landing on June 23d in Yakutat Bay, the party spent a day in crossing the narrow fringe of forest, and five days in forcing their way over the vast terminal moraine at the rate of less than a mile a day, for here the difficulties of transporting food, fuel and sheltertents were very great. From June 29th to July 30th, they travelled over snow-covered glaciers, first the Malaspina, a vast lake of ice some fifty miles long and thirty wide, with many lakes and torrents on its surface necessitating frequent detours. Crossing the Seward glacier, a feeder of the Malaspina, and then turning west, they surmounted a snow-pass, traversed the Agassiz glacier, and then forced their way up the Newton glacier which rises to the If the Malaspina resembles a northeast of Mount St. Elias. frozen lake, the Newton may be compared to a frozen torrent, and the skill of the Italian guides was taxed to find a way through the labyrinth of crevasses and three formidable ice-falls; but it was only here that serious mountaineering difficulties were encountered. Their severity is shown by the fact that this stage occupied thirteen days, during which snow fell almost continuously, with dense On July 30th they gained Russell Pass on the north side of the peak, and formed their furthest camp at a height of over 12,-

000 feet. Next day, starting soon after midnight, the whole party, the prince, his four companions and five Italian guides and porters, reached the summit shortly before noon, their route lying up the snowy ridge of the mountain over slopes of moderate steepness, stepcutting being required only in a few places. In the latter part of the ascent they suffered considerably from difficulty of breathing, palpitation of the heart, headache and general weakness, being forced to halt every five minutes. Fortunately, the weather favored them, and there was no wind. Fog lay to the south, shutting out the Malaspina glacier and the ocean, but in the other directions they enjoyed a marvellous view over a vast region of snow and ice, the rival peak of Mount Logan rising some thirty miles to the The height of Mount St. Elias was found by mercurial barometer to be 18,060, six feet more than the result arrived at by Professor Russell by triangulation in 1891. Sella secured some excellent photographs, and after half an hour's stay they descended, rejoined their American porters at a camp on the glacier, and reached the coast on the 11th of August.

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WAS SOUTH AMERICA SIGHTED BEFORE 1448?--

Columbus is so generally accepted as the discoverer of America. that—leaving the claims of the Northmen entirely aside—it seems well to note some facts which are coming to light about a possible earlier discovery of South America.*

In the Ambrosian Library in Milan is a map on vellum, 86 centimetres by 63 centimetres. It was drawn by Andrea Biancho, a Venetian cartographer, in 1448, and its authenticity is generally accepted. It is one of the "portolani," that is, one of the maps made by seamen for seamen for practical purposes, and free from the fanciful geographical conceptions and the fabulous zoölogical monstrosities of the maps drawn by convent monks. The map

*The chief writers so far on the subject, which has assumed the position of a controversy, are Mr. Yule Oldham, in the Geographical Journal for March, 1895; Signor Carlo Errera in Memorie della Societa Geografica Italiana V. 1 Rome, 1895; and Mr. Batalha-Reis in the Geographical Journal for February, 1897.

takes in France, Spain and the African coast down to Cape Verde, and, as far as known, is the first record of the coast line of Cape Verde.

The remarkable feature of the map, however, is that at the extreme lower left hand corner is represented an extensive coast line of a land southwest of Cape Verde. On this is an inscription in the old Venetian dialect which seems to read: "ixola otinticha xe longa a ponente 1500 mia." This may be translated; "Authentic island is distant 1500 miles to the West."

The position of the coast line and the legend together seem to show that somebody, before the year 1448, had seen a land southwest of Cape Verde, and some 1500 miles distant. But there is no island in this position, while at 1520 miles southwest of Cape Verde is the northeast promontory of South America.

It has been suggested that, granting that the map is authentic, yet that the land and the legend may have been added later. This seems inadmissible, for no one would have mapped the coast of Brazil as an "authentic island" after the voyage of Cabral. The very awkwardness of the legend seems the best proof of its authenticity.

The question now is whether there is any evidence to show that such a discovery might have been made, as there is no known account of any voyage recording such a discovery.

The first thing to be noted is that many navigators of the 15th century sailed far into the Atlantic. Long voyages are recorded in 1452, 1457, 1460, 1462, 1473, 1475, 1476, 1480–81, 1484, 1486. Some of these went at least 150 leagues to the west; one of them discovered the Sargasso Sea; all of them were in search of lands or islands in which the belief was very general.

There is also an increasing number of proofs that many early voyages were either unrecorded or that the records have been destroyed or lost. Every year the Portuguese and Spanish libraries and private archives are yielding documents revealing totally unknown circumstances. It is known, for instance, that seven of the Azores were discovered by the Portuguese between 1431 and 1449, but there is no record of the occupation. A whole district of the island of Madeira is called Machico, and it was not till 1894 that a unique document showed that this was the name of a Portuguese

sailor of 1379. It was also only in 1894 that entirely private documents were discovered showing that João Fernandes Lavrador was one of the commanders of one or more expeditions sent to discover lands to the northwest of Europe between 1491 and 1496. This was probably the origin, hitherto unknown, of the name of part of North America.

It is, therefore, perfectly possible that such a discovery may have been made and left unrecorded if, for instance, it was made by some merchant vessel or fishing boat blown out to sea. That such a discovery was not followed up, would be simply because no one at that time could have any idea of what such a discovery meant. The land would have been looked on as another island and one too far away to be of much use.

But there is some indirect evidence on the matter.

On Martin Behaim's globe of 1492, there is a large island in the position of part of the coast of South America, in fact in the exact position given by the legend on Biancho's map of 1448.

Las Casas, writing between 1552 and 1561, about the third voyage of Columbus in 1498, says that Columbus wanted to go south because he believed he could find lands and islands, and also because he wanted to see what King D. Joâo of Portugal meant when he said that there was "terra firma" to the south. The grounds for the belief of Columbus have never been explained.

In 1500, Master João, physician to D. Manuel of Portugal, wrote to the King on the 1st of May, about the land (South America) just found by the fleet of Cabral on board of which he was, "that those lands might the King see represented on the mappamundi which Pero Vaz Bisagudo had!" He adds that the mappamundi does not mention if the land were inhabited, while he, Master João, could certify it (Brazil) to be well peopled. He also says that the said mappamundi was ancient. This last statement is strong evidence that somebody must have seen the land before 1492.

Last comes the Treaty of Tordesillas of 1494, which ensured to Portugal all the eastern part of South America. Why this treaty should have been ratified unless the Portuguese already had knowledge of these lands it is hard to see. Spain claimed the lands discovered by Columbus, and Portugal probably claimed the lands to the south she already knew of.

Although our present information is still too vague to speak with certainty, yet there is surely a strong possibility or indeed more than that, a strong probability, that the continent of South America was sighted by the Portuguese before 1448.

EDWIN SWIFT BALCH.

PHILADELPHIA, Pa.

SOME SUGGESTIONS FOR TEACHING ELEMENTARY METEOROLOGY.

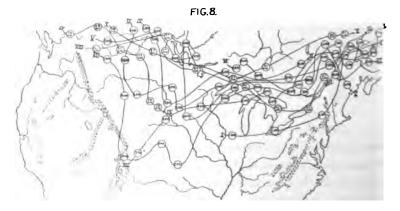
(Continued from page 104.)

Daily weather phenomena have always been the subject of public comment and speculation. Because of this general interest, various imposters have appeared with schedules setting forth just what atmospheric changes and storms will occur during the ensuing month or year, thus relieving the "Clerk of the Weather" from all anxiety, and even depriving him of a legitimate excuse for existence. Astonishingly widespread credence has been given these so-called forecasts. And, where they have been rejected, it has been as frequently through a belief that the whole matter is controlled by chance as it has been through an intelligent comprehension of the real facts. Instruction in the public schools, therefore, which shall furnish a correct understanding of the laws controlling the commoner atmospheric phenomena, and which shall thus destroy widespread superstition, foolish credulity, or ignorant indifference, will be accomplishing a great moral and practical good.

Any claim to the ability to foretell storms, months, days or even several hours in advance of their actual existence, is arrant nonsense. General atmospheric conditions may be relied upon to change with the seasons with almost periodic regularity. Each year is largely a repetition of those which have preceded it. But a local, irregular departure from the normal conditions is quite another matter. Here, we must wait until the storm has actually formed over some portion of the country; then we may trace out those localities which will be subjected to its influence, and may announce, with reasonable accuracy, even some hours in advance what the influences will be. The pupils who, in the preceding exercises, have discovered

the typical grouping of weather elements about areas of high and low barometer, have accomplished the first steps necessary to such study of weather changes. The older pupils of the grammar school, who have had this preliminary training, may go still farther.

It remains to be established, that high and low barometer areas, once formed, are not stationary, but that they move across the country, carrying their characteristic weather types with them—or rather putting new air into motion, thus producing the conditions as they go. The teacher should select several consecutive maps and require the pupils to observe the positions occupied by the areas of low barometer on successive days. This can be done very satisfactorily by having the pupils indicate the positions on a blank map, by means of small circles. Inside each circle, the date of the map from which it was obtained should be placed. By connecting the circles representing successive positions of the same area, by straight lines, the approximate path travelled over may be shown.* The average direction of motion for low pressure areas will be found to be slightly to the north of east.



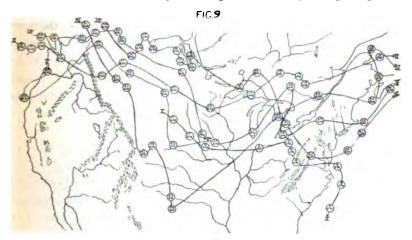
TRACKS OF CENTERS OF LOW PRESSURE FOR AUGUST 1896

Fig. 8 gives the paths followed by the areas of low pressure for August, 1896. The Roman numerals at each end of the paths

^{*} The Monthly Weather Review published by U. S. Weather Bureau, will be very helpful in this work, as it shows both the 8 A. M. and 8 P. M. positions. Address The Chief of the U. S. Weather Bureau, Washington, D. C. Price, \$1.00 per year, or 10 cents per copy.

show the order of occurrence of the areas, that formed on the first day of the month being considered as I. The letters within the circles designate the 8 A. M. and 8 P. M. positions, and the accompanying figure, the day of the month.

A determination of the velocity of this northeastward motion may easily be made, with the aid of the scale of miles appended to the blank map. The distance on the map, measured from the centre of one circle to the centre of that next succeeding, reduced to miles according to the scale, and divided by twenty-four, will give the velocity in miles per hour. The result thus obtained will vary considerably for different areas, but will, usually, be somewhere between fifteen and thirty miles per hour. By computing the



TRACKS OF CENTERS OF HIGH PRESSURE FOR AUGUST 1896.

velocities of the different low barometer areas for all the twentyfour-hour periods shown on the map, and then taking the average of these, a fairly accurate determination of the average velocity for the month may be made.

The average velocity of a summer month should be compared with that for a winter month and the marked increase in velocity during the winter noted. As a rule, the winter velocities are nearly twice as great as those of summer. This fact, together with the direction traveled, seems to point to the prevailing winds as the main cause for the progressive movement. The areas seem to be eddies borne along in the general air current.

The direction and rate of the progressive movement of high barometer areas may be found in a similar manner. Such areas move eastward or southeastward along somewhat irregular paths, at a much slower rate than was found for low barometer areas. Probably they drift along with the prevailing winds alone to furnish an impetus, while the areas of low barometer are accelerated by the constant tendency to produce a region of low pressure just eastward of the original one, through the effect of the great amount of heat set free during the heavy condensation on that side. Fig. 9 shows the tracks of the centres of high pressure for August, 1896. The figures have the same meaning as in Fig. 8.

Manifestly, the weather of the United States is normally under the control of the atmospheric conditions common to north temperate latitudes. Principal among these are the prevailing westerly winds. This normal regularity is frequently interrupted, however, by sudden local changes and storms caused by the passage over or near the locality of areas of high or low barometer. To illustrate this, let the pupils place the diagram of typical weather conditions at a low pressure area (Fig. 6, page 100), drawn to approximately the scale of the map, on a sheet of tracing paper, and then move it slowly northeastward over a blank map, past any selected station.

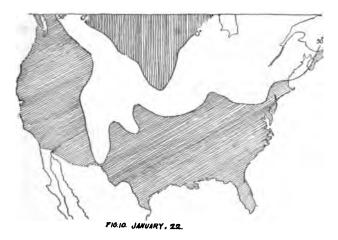
Suppose the location of the station be such that the portion of the area along the line AB passes over it. As the area approaches, an observer at this station will notice light, easterly or northeasterly winds, which shift more to the southward and increase in strength. Meanwhile, the temperature will rise, the cloudiness will increase until rain occurs, and the barometer will fall steadily. When the barometer readings have reached their lowest point, the winds will weaken, then shift to the northwest, and increase in strength, while the temperature will rapidly fall, the barometer rise, and the clouds break away and finally disappear. The rate at which these changes occur will, of course, depend upon the velocity with which the area is moved northeastward.

If the portion along the line CD passes over the station, the observer will notice similar, though less marked, changes in air pressure, while the winds will shift or "veer" steadily from the southeast around through the south to the southwest or west.

The temperature will be quite warm at first, but will grow steadily colder.

If the centre of the area lies to the south of the station so that the portion along EF is received, the observer will notice a change in the wind direction from east around through north to northwest. Clouds and possibly rain will occur while easterly winds prevail, but, as the winds become northerly, the clouds will clear away and it will become colder.

Any sudden changes in the direction of progression while passing the station, will produce unexpected and unusual changes in the weather.



In the same manner, let the typical diagram of weather at a high pressure area (Fig. 7, page 102), be passed southeastward over the station, and the changing conditions noted. Clear, cool weather, a rising and then falling barometer, and northwest winds, which slacken and then spring up from the east, will occur if the centre passes over the station. If the centre passes north of the station, the temperature will fall and then rise, the barometer will rise and then fall, while the winds will shift from northeast through east to southeast. When the centre passes to the south of the station, the temperature will not change much, while the winds will shift from the northwest around through the west to the southwest or south.

Reference to Figs. 1 and 3, page 61, will help to make the

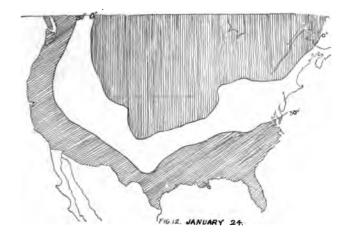
changes in wind direction clearer, as these show the whirls at high and low pressure areas more in detail.

At the same time as the pupils are tracing out the sequence of weather phenomena on the weather maps, they should be led to watch for similar changes in the daily weather of their own locality. Let them search their monthly record sheets for traces of passing high and low pressure areas, and, having found them, let them relate all the weather elements to the position and nature of the areas, and then verify their conclusions by reference to the weather maps of the proper dates. Let them observe closely each day's changes in weather, until connection is made between very



clear weather and excessively cold nights, and the passage of an area of high barometer; until they can recognize, from such local conditions as the eastward motion of upper cirrus clouds, the gathering of cirro stratus and stratus clouds, the falling barometric column, and the direction and shifting of the winds, the approach of a storm area; and until they can decide, with considerable accuracy, the position of the storm centre with respect to the home locality. In all this work, the current weather maps will serve to correct wrong conclusions, and to show the connection between local and general atmospheric conditions. When the class has acquired such a clear understanding of the natural sequence of weather changes as to render the exercise something more than mere guess work, forecasting may be attempted.

Unusual storms or changes of any nature should invariably be looked up on the current weather maps. One of the most striking of these constitutes what is commonly called a "cold wave." A region of comparatively high temperature occupies the front or eastern part of a low pressure area. Coming immediately behind this, on the western and northern sides, with a sudden transition from one to the other, is a cold region swept by northerly winds. As the area moves across the country, the low temperatures slowly creep eastward and southward from out the northwest, occasionally bringing freezing weather as far south as Florida. This may all be shown very effectively, by drawing off a few of the "warped"

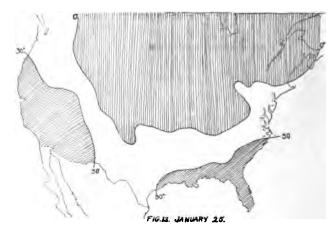


isotherms at the low pressure area on a sheet of tracing paper and moving the chart thus made eastward over the various stations.

By selecting maps which show the development and progress of a cold wave on consecutive dates, and coloring them to bring out the temperature clearly, a series of very instructive "cold wave charts" may be made. Figs. 10–13 show such a series for January 22d to 25th, 1897. The unshaded portions include temperatures from zero to thirty degrees, and the lined shadings represent temperatures lower than zero in the north, and above thirty degrees in the south. An area of low pressure, central just south of the Great Lakes on January 22, moved eastward on the succeeding days, drawing down into the Mississippi Valley on its western side

the cold north winds from out of an area of very high pressure located in the northwest.

In conclusion, let me warn both pupils and teachers against discouragement over apparent difficulties or exceptions. Even experienced weather observers make mistakes occasionally. And, as has been suggested, sudden changes in the path pursued by storm areas will produce unexpected changes in the weather. But these are the exceptions rather than the rule. Usually, each storm area closely resembles, in its main features, those which have preceded it. Patient observation will not fail to reduce our commoner weather phenomena to such an orderly sequence that they come readily within our understanding.



The following books and pamphlets will be very helpful to any teachers who are putting into practice the suggestions of the preceding series of articles:

Davis' Elementary Meteorology, Ginn & Co.; Waldo's Meteorology, American Book Co.; Journal of School Geography, February, 1897; Instructions to Voluntary Weather Observers, U.S. Weather Bureau; "The Law of Storms,"—Notice to Mariners for the Great Lakes, September, 1896, U.S. Hydrographic Office; The Report of the Committee of Ten, U.S. Bureau of Education; Monthly Weather Review, U.S. Weather Bureau.

J. M. JAMESON.

PRATT INSTITUTE, Brooklyn, N. Y.

A Criticism and Reply.

RALEIGH, N. C., January 28, 1898.

To the Editor of the Journal of School Geography.

My Dear Sir:

I wish to make a criticism of Professor Davis' method in the January number of the JOURNAL OF SCHOOL GEOGRAPHY for determining latitude, which it says is "Simpler because it can be done on any day." On the contrary, it is more complex, and there is no day that it can be done by school children, or a common school teacher. He says, "drive a peg into the ground so that it stands at right angles to the diurnal path of the sun across the sky." This assumes one of the things to be found out, that is the path of the sun on any particular day. How is that to be determined?

Again, it is not sufficient to drive a peg "about at right angles to the diurnal path of the sun." It must be exactly at right angles, unless the pointer is so constructed that it can point in any direction. This attachment would require two axes to turn upon, and would be hard to make. Moreover, it would be hard to point exactly towards the sun with any degree of accuracy, and it would be impossible to drive stakes into the ground so that the tops would just touch the end of the pointer each time. But if we could establish this circle of stake-tops exactly parallel to the circle of the sun, how are school children, or any one without a costly instrument, to measure the angle between the plane of this circle and a vertical line?

Professor Davis' method is theoretically correct. But I do not believe there is any school where it can be carried out. Moreover, all the intermediate steps make it much more complex than the simpler methods of letting the sun shine directly upon a quadrant, and reading its vertical angle written by the sun itself.

LOGAN D. HOWELL.

TO THE EDITOR OF THE JOURNAL OF SCHOOL GEOGRAPHY: In spite of what Superintendent Howell writes, it still seems to me

that the sun-circle method of determining local latitude is to be preferred for school use to the method by the heliotrope, for the following reasons: (1) It does not require any previous intentional observation on the sun, other than that which must naturally precede the whole question of latitude. Any pupil who is competent to carry out the method must already know roughly how the sun crosses the sky, and can therefore set the axis-peg in good enough position for entirely satisfactory results. The long delay from a solstice to the second equinox thereafter, as required by the heliotrope method (if performed without borrowing observations or conclusions) is avoided. (2) The geometrical considerations involved in the sun-circle method are simpler than those of the heliotrope method. They make a closer approach to fundamentals. A young scholar can more easily perceive the relation of any single sun or star-circle to the earth and sky-axis and to the local horizon, than the relation of the extreme or solsticial sun-circles to each other, and to their mid-way circle, or sky equator. In the heliotrope method it is almost impossible to avoid the serious problem of the oblique attitude of the earth's axis to the ecliptic, a complication that does not enter the sun's circle method. (3) As Mr. Howell has perceived, it is not at all necessary to set the axispeg precisely parallel to the earth's axis; but instead of constructing an elaborate instrument with two axes (as he suggests), I use a thin pointer, which is free to twist somewhat on the wire nail that serves for its pivot. There is then no practical difficulty in directing it to the sun; nor is it difficult to carry out the rest of the work to a result within a few degrees of the truth—a fair limit for beginners. (4) It requires no more construction to measure the angle made by the sun-circle with the horizon than to measure the sun's altitude on the heliotrope. Each method requires the division of a quadrant, roughly or carefully, or the use of a quadrant already divided, as the teacher may prefer. Each method should be freely used in a school where geography is taught by observation.

The statement that there is no day on which the observations of the sun-circle can be made "by school children, or by a common school teacher" is a mystery to me, unless it means that a teacher and her scholars must not interrupt, even for five minutes, the time

schedule of the school. I believe that a school in which good discipline prevails, and in which the teacher has the confidence of the children, may be easily allowed all the necessary sun-circle work to be done, not only with no injury to the rest of the work, but greatly to the profit of all concerned. The first observation can be made with the aid of the teacher before school. The second, by pupils alone, in the morning recess. A third and fourth at the beginning and end of noon intermission. A final observation on the sun and the measurement of the slant of the stake-top plane may be made at the close of school in the afternoon. As for the scholars, many of them become so interested in this kind of work, if well taught, that they willingly give time on Saturdays, or holidays, toits independent performance. Wholesome emulation may be excited in it. As long as they look on observational work as a penalty instead of as a privilege, the teaching is not very profitable. We are probably all of us (surely I am) far from exciting the ideal response in our scholars; but it is the ideal we aim at.

W. M. DAVIS.

Cotidal Lines.—A curious relic that lingers in some of our geographies is the map of cotidal lines, proposed tentatively by Dr. Whewell in 1833 and, as far as most parts of the world are concerned, abandoned by him in 1835.

The scheme was entertained by its author for two years, and with us it has lasted more than sixty.

Whewell's original diagram of cotidal lines advancing up the Atlantic from the southern ocean appeared in the *Philosophical Transactions for 1833*, accompanying an "Essay towards a First Approximation to a Map of Cotidal Lines." It was based on such tidal information as he could glean from charts and instructions to mariners for various parts of the world. The observations had not been made on any consistent plan, and they inspired Dr. Whewell himself with very little confidence. But the interest the article awakened enabled him to get a series of simultaneous observations made between the 8th and 28th of June, 1835, at 666 North Atlantic stations in Europe and America, and two at the Cape of Good Hope. These observations satisfied Dr. Whewell that the cotidal lines were far too irregular to be drawn in any

region not abounding in well determined tidal stations, and that it could not be shown to be probable that the tidal wave advanced from the South Atlantic to the North Atlantic. In particular, an effect of the moon's changing position, known as the Diurnal Inequality, reached its maximum at about the same time on the coast of Spain and the Cape of Good Hope, whereas the progressive tidal wave was supposed in the first essay to spend fifteen hours in the journey. On the other hand, on the coasts of Europe and North America, where it was expected the maximum would occur at about the same time, there was a difference of several days. (*Phil. Trans.*, 1835, p. 289 et seq.)

The reconstruction of the general cotidal system was postponed until a time when good observations should cover a wider range of territory.

A new map was published, but only for the British Isles and The improved data of this map are usually incorporated in the modern maps, which is not the case with certain corrections for the American coast which Whewell suggested, but did not These suggestions are in line with Bache's Map of Cotidal Lines for the Atlantic Coast of North America, published in the Report of the United States Coast and Geodetic Survey for The distinction between the first essay and the better data here is easily seen in the region about Hatteras. In the first essay Hatteras lay well within the elbow of the one-hour cotidal line, which sprang from the coast at Charleston and extended to Nova Scotia in a curve strongly convex to the east. later view was that the XII-hour line lay just off shore, but contouring closely along it from Hatteras to Nantucket. This would require the one-hour line to stay ashore.

William Ferrell, in his "Treatise on the Tides" (United States Coast and Geodetic Survey for 1874), asserts that a dike from Africa to America along the equator would probably not affect the tides of the North Atlantic.

M. S. W. J.

Province of Ontaria.—The Province of Ontario can boast of as many distinctly different climates as can any country in the world. That part of the Province which lies immediately north and northeast of Lake Superior, and which forms the northern watershed of

that great lake, has a long cold winter, and at times extremely low temperatures are recorded; indeed, scarcely a winter passes without 50° below zero being registered at White River, a station on the Canadian Pacific Railway. As a rule, the snow does not disappear from the woods until the beginning of May, after which time, however, the summer advances very rapidly, and four months of superb weather follow. Travelling east and southeast, the climate quickly improves, and in the valley of the Ottawa and the upper St. Lawrence we find a moderately cold winter, but a singularly exhilarating, bracing atmosphere, which makes a zero temperature by no means unpleasant. Signs of spring are not wanting early in April and by the beginning of May foliage is well advanced, and then follows a decidedly warm summer. The whole of this region is, between the middle of May and middle of September, included between the same isotherms as the greater portion of France, and after a protracted autumn, winter sets in again in November. The mean annual temperature of Montreal is 41°8, and of St. Petersburg 38°7. A comparison of the annual curves for the two places is interesting: the mean for January at Montreal is 5° lower than at St. Petersburg; in February it is but 1° lower, and then the Montreal curve steadily rises above the other, until in August it is 6° higher; after this the two curves draw together and by December are coincident.

In the peninsula of Ontario, or that portion of the Province which lies east of Lake Huron and north of Lake Erie and the western portion of Lake Ontario, the winters are by no means severe, and the summers are seldom oppressively hot, this being due to the tempering influence of the lakes by which this part of Ontario is surrounded. In the western counties the April mean temperature corresponds nearly to that of southern Scotland, and in May the mean temperature of the whole district is slightly higher than for the south of England. The temperature conditions during the summer months may, as in the Ottawa and upper St. Lawrence valleys, be compared with those of France, the normal temperature for July ranging between 66° and 72°. September and October are generally delightful months, and seldom does snow remain on the ground until well on in December, except on the highlands of the interior counties. That portion of Ontario which lies imme-

diately east of the Georgian Bay, the District of Muskoka at an elevation of 700 feet above the sea, abounding in small lakes possesses a wonderfully bracing atmosphere, which, with a very high percentage of bright sunshine and a pleasant temperature, has made this region a summer resort much frequented by people from the cities and towns farther south.—Scot. Geog. Mag., February. 1898.

New Caledonia.—New Caledonia is above all a mining country, and presents in this particular an exceptional richness and variety. Gold, silver, lead, zinc, iron, chromium, cobalt, nickel, antimony, manganese and coal are found. The gold thus far has not given rise to great investigation, and only one vein has been seriously worked, that of Fern Hill in Manghine, on the left bank of the Diahot. In the same region are all the principal copper mines, the working of which has almost entirely ceased. The iron bearing are extremely numerous. Nowhere, says M. Garnier, even in Russia, is found such a great abundance of iron ore as in New Caledonia. The mineral is here, not in veins or beds, but in great heaps; it is the relief of the earth. In the mines, sometimes, the bottom, borders and sides are made of it.

The working of the many cobalt mines has lowered the price of oxydized cobalt, which has gone from 60 francs to 25 francs, and even to 15 francs a kilogram, and has increased the consumption. New Caledonia actually furnishes two-thirds of the production of cobalt.

But the richest mineral of the island is nickel. New Caledonia is certainly the country containing the most nickel, and it can be said that the beds of this metal are inexhaustible. Also, since the opening of the Caledonian mines, the prices of nickel have fallen enormously, and the consumption has taken on an unexpected increase. The greatest rival of New Caledonia is Canada, where the working of nickel has had an enormous development; but the richness of New Caledonia is such a one that it seems doubtful if they can ever take from it the first rank in the production of nickel.

The experiments made on the Caledonian coals have shown that they are usable for industry and navigation; but the bearings are not yet well enough determined, nor the capital sufficient to ven-

ture into working these coal mines. Yet of what importance, for this unrivalled mining country, will these coal mines be! There is actually in New Caledonia a quantity of coal which can be estimated at 20,000 tons. All the fuel comes from Australia, where they provision equally the Compagnie des Messageries Maritimes, the merchant marine and that of the State.—Soc. de Geog. Com. du Havre.

Lake Shirwa.—The African country southeast of Lake Nyassa is described by J. E. S. Moore (Geog. Journ., X., 1897, 289-300) as composed of lofty granite mountains, with axes about north and south, between which are broad, flat depressions filled with waste from the mountains. From this it may be inferred that the more or less mountainous region has been deformed, bent, perhaps broken irregularly, and that the waste from the uplifted parts has been washed and is still washing down into the relatively depressed parts. The uplifted areas, or mountains, are wearing down; the depressed areas, or basins, are filling up. The filling basins form the extensive malarial flats which prevail in the region to-day. Their margins consist of the decomposed granitic waste annually swept down from the hills, when the subequatorial rains migrate southward. The central parts of the basins present a succession of swampy plains at different levels and of widely different areas. One of the largest of these central basins is occupied by the immense reed swamps and foul open salt water of the "The horrible nature of the country around shallow Lake Shirwa. Lake Shirwa is almost indescribable, but every objectionable feature of a tropical quagmire seems to have become accentuated about its dismal sweltering shores, and the crowds of cranes, flamingoes, and screaming water-birds which jostle one another for room among the reeds only add to the peculiarly depressing nature of the scene. Above the surface of this detestable lake, which is always blurred by a mirage effect (that seems to be related to the miasmatic stench lying over its surface, and which one can escape by standing up in a canoe), there are two conspicuous islands exactly similar to the granitekopjes (knobs) which rise above the surface of the plain near the lake. * * * To the north, this plain is really continuous with the great alluvial flat surrounding the southern shore of Lake Nyassa." Nyassa gathers enough water to overflow; its outlet being the Shire river, which runs southward for fifty miles through the alluvial plain, and then crosses a granite belt; there it has cut the famous gorge of the Murchison cataracts, while descending to lower lands. The granite belt is therefore the hardrock sill which as yet holds up the level of the Nyassa basin and its dependencies. Lake Shirwa has no outlet on Moore's map, although the Lugenda river, a considerable stream, enters its basin from the north.

It should be noted that, while a shallow salt lake, like Shirwa, is probably of variable area, it need not necessarily be concluded that its waters once extended all over the area of the waste plains around it, as Moore implies; for washed waste plains of moderate slope are the normal product of changing weather and running water, whereby the waste creeps and washes forward from its higher source into neighboring lower ground. Otherwise, Moore's description gives an excellent idea of a basin and lake of the Shirwa type. W. M. D.

Imaginary Countries.—Among the "Suggestions for Teaching," which have appeared in the JOURNAL, I have not noticed what I consider one of the most useful for both teaching and testing purposes. I mean the construction of imaginary countries. I give my boys the latitude, size, surroundings and surface of some imaginary country, and they evolve the climate, vegetation, towns, etc. They seem really to enjoy the work, partly because it makes them realize their own growth in mental power; and it brings out at once any misconceptions about the causes or the workings of the various phenomena. L. W. L.

The Preferences of Pupils in Reference to Geographical Facts.—It would be very interesting to hear the experience of practical teachers with regard to any curious preferences shown by a whole class for some point on which one has not laid special stress, and to which one has certainly not devoted any extra time.

I have had two separate classes doing "Europe," and they seem almost to have "agreed" amongst themselves to remember special things, whatever else they forgot. In an examination on each

country in turn, 80 to 90 per cent. of them will reproduce exactly the same single fact, while on no other fact will even 30 per cent. agree.

In Italy it is a fact about the surroundings, in Greece about the surface, in France about the vegetation; but of half a dozen questions on Italy, the whole class "agrees" to reproduce the one fact that as the Alps are concave to Italy, the passes converge on Turin, and therefore it has always been more easy to invade Italy from France than France from Italy.

The one point which all agree to remember about Greece is the arrangement of the valleys with its effect on commerce and politics; and so with the difference in latitude of the champagne and claret areas of France, to which every one adds that champagne grapes do not require to be perfectly ripened.

Is there not here a hint towards saving time and deepening interest by accepting limitations? L. W. L.

The Salt Industry of St. Christopher.—St. Christopher, though essentially a sugar-producing island, possesses also means for the manufacture of salt. The two articles require, however, weather as different as day and night for their production. During the last three years rain has fallen in copious showers, which, while tending to produce an abundant harvest of sugar cane, has completely put a stop to the salt industry.

The southeastern extremity of St. Christopher, in striking contrast with the other parts of the islands, is extremely dry and barren, and here is situated the plantation known as the "Salt Pond Estate," covering an area of about 2,400 acres. Formerly, sugar cane was cultivated to a considerable extent, as the abandoned works mutely testify, but this industry has long since ceased to exist. Salt is now the only article that makes the property of value, and it is obtained from a pond at least 300 acres in extent. In form it is oval, and the water around the shores averages from 3 to 5 inches in depth, while in the centre it is about 2 feet. The bottom is covered by soft, black mud, upon which the crystallization takes place. At a distance of 300 yards there is a smaller pond, which is used as a reservoir for the preparation of brine, and the western shore of which is contiguous to the sea.

The process is as follows: From the sea to the reservoir there is a canal, with a flood gate through which sea water is let in until a sufficient quantity is obtained. The flood gate is then closed and evaporation by solar heat takes place. From a density of about 3°, the ordinary saline strength of sea water, the evaporation continues until 16° or 18° is reached, which is tested by means of a hydrometer. The brine thus formed is transferred through another canal from the reservoir to the salt pond, where the evaporation continues until the density is 25°. At this point the salt can no longer be held in solution, and its deposit on the mud below commences. Should the surface of the water be unruffled by the wind the process can be seen to perfection. The salt. looking like grease floating on the water, gradually breaks away and trickles to the bottom, where it looks like thin, watery milk. This deposit goes on from day to day until crystals are perceptible, and these increase in size until considered mature, the sides of the top squares of the grains averaging from three-quarters of an inch to 2 inches in length.

The harvesting now begins. The laborers, provided with wicker baskets made in the shape of a basin and holding half a bushel, enter the pond, break the layer or crust of salt (varying from three-quarters of an inch to 2 inches in thickness), and by means of their hands lift large flakes, which are thrown into the basket. When full, the baskets are moved in the water in such a manner as to leave the salt thoroughly cleansed from mud or any particle of dirt, and to cause the flakes to break into grains. plished, the salt is thrown into large flat-bottomed punts holding each about 30 barrels. When the punts are laden they are forced by means of poles through the shallow water and soft mud until they are as near the delivery point as they can be got. The salt is then taken in trays and tubs, on the laborers' heads, to the pile where it is measured in barrels, the piles containing from 30,000 to 50,000 barrels.

The laborers are paid from 6 to 8 cents per barrel for the salt delivered on the pile, and thus an expert can earn from 75 cents to \$1 per day.

The salt is of superior quality and is very heavy, averaging 87 pounds to the bushel. It is well adapted in its natural state, i. e.,

while the grains are coarse, to the packing of beef and pork, and when crushed or ground, to the preservation of codfish, etc.

Formerly, shipments were made to the United States, but during the last years, owing to unfavorable weather, the manufacture of the article has been impossible.

The property is owned by a baronet in England, who, it is said, from a combination of favorable circumstances, once earned \$20,000 during one year.

The pond is capable of producing, in favorable weather, about 300,000 bushels. Consular Reports, December, 1897.

Railways of the World.—There are now, in round figures, about 466,000 miles of railway open for traffic, made up of 160,-000 in Europe, 250,000 in America, 30,000 in Asia, 10,000 in Africa, and 16,000 in Australia, which may be estimated to have cost upwards of £12,000,000,000. In the United Kingdom 22,-000 miles have cost £1,020,000,000. China, now at last making a serious commencement, has yet to be provided for. Russia is preparing to extend her Siberian railway through Northern China, and her Transcaucasian railway via Teheran to the Indian Ocean. The Russian-Manchurian, or Chinese Eastern railway, will intersect the Chinese frontier at Staro-Tsurukaitui, and pass the towns of Chichihar, Hwang-chang and Ninguta, joining the Siberian line at Nikolskoye. Out of 1,280 miles, as the total of the Manchurian railway, 946 will pass through Chinese territory. It will save 342 miles as compared with the line within the Russian border, and will pass through a better climate with more productive soil. Egypt is constructing 3,000 miles of railway between Wadi Halfa and Abu Hamed, as another step towards completing her connection with the Soudan, and will, no doubt, when she regains possession of the Nile at Berber, construct the Suakim-Berber railway, and thus reduce the distance from Khartoum to the sea to 500 miles, as compared with 2,000 miles by the Nile from Khartoum to Alexandria. This will, by placing the Red Sea in communication with thousands of miles of lake and river navigation, do more than any other railway to open out the fruitful regions of the Eastern Soudan to civilization and commerce. Another railway will ere long be undertaken to Kano, the commercial centre of the

Western Soudan, with 120,000 inhabitants; and in East Africa a line through German territory from Chiromo to Matope will connect Lake Nyassa with the sea. The railway through Rhodesia is being pushed forward to Buluwayo; but a vast amount remains to be done on the African continent as well as in other parts of the world.—Scot. Geog. Mag., July, 1897.

REVIEWS.

A Geography of North America, Including the West Indies. LIONEL W. LYDE. Adam and Charles Black, London, 1898. Pp. vi+116.

There is much to commend in the recent text-book of geography noted above, and we believe teachers will find it rich in suggestive material which is well and simply classified. This simple classification into topics containing statements of facts with illustrations makes the book valuable for reference, and if used in this way would tend to develop in children an ability rarely developed in our grammar schools, viz: the ability to use a reference book independently.

The separation of the text and the atlas is, we think, an excellent feature, not only because of the greater facility thus given to use in the class, but also because this arrangement makes it possible to put a light, compact little volume into the hands of children, thereby relieving them of the strain of carrying to and from school the cumbersome geography of traditional form.

Teachers generally will agree with the statement the author makes in his preface that most text-books contain much that would be better learned from the atlas; but in spite of this statement, the query rises repeatedly as we turn the pages, Why not give the children the satisfaction and training of finding these facts out for themselves from the reading of maps? The greater number of the facts and illustrations under the headings "Surroundings," "Climate," and "Towns and Industries" can be discovered by any child in the upper grammar grades who has a good map and who has been taught the simpler laws of heat. Chiefly for this reason we should not advise the use of this geography as a text-book; but

as a supplement to inductive work, or as a book of reference for class or teacher, we can heartily recommend it.

We regret that the author has seen fit to ignore entirely the relation between land forms and processes, and the relation of man thereto, for such relationships are necessary to give the best understanding. With the exception of a few statements, such as the raising of the bed of the Mississippi by the alluvium and the consequent levees, and the fact that the Southern States were not covered with glacial drift, and are now suffering from an impoverished soil, the attention of the pupil is not turned forcibly to the controls that geographic features exert on human conditions.

Typographically the book is pleasing and to be praised. The type is clear, the spacing well ordered, and the pages arranged so as to be easily used for reference. The index is good, and the subject index is separated from the index of towns, which is most commendable.

Though written primarily for use in Europe, the book is most valuable in the United States, and should commend itself at first sight.

C. W. H.

Folio 30. Yellowstone National Park. U. S. Geological Survey, Washington, D. C.

The illustrated Folio No. 30, of the United States Geological Survey, costing seventy-five cents, is the very best possible source of reference concerning the Yellowstone National Park, an area that is full of interest to all, and concerning which there are many popular and erroneous ideas.

The Folio gives a description of the geography, topography and geology of the region, as well as other reading matter applicable to all folios.

Besides the reading matter, the Folio contains eleven well chosen and well produced pictures of typical phenomena of general interest. There are also four maps showing by contour lines the physical features of the region, and four maps, printed on the topographic maps as a basis, showing the distribution of the various kinds of rocks described in the text.

This folio is but one of nearly forty published by the United States Geological Survey, any of which contain a great deal

of value for geography teaching. This one is perhaps, however, the most generally interesting of those thus far published.

R. E. D.

CURRENT LITERATURE.

Geographical Journal, London. February, 1898. Jackson, Three Years' Exploration in Franz Josef Land; Pease, A Volcanic Crater in Northern Somali-land; Hand-Book of Climatology; The Hydrographic Exploration of Lake Baikal: Mill, The Classification of Geography; Newell, Hydrography of the United States; Dodge, Scientific Geography for Schools; The Highland Controversy; The Upper Nile.

Geographische Zeitschrift, Leipzig. February, 1898. Credner, Excursions to the Urals and Caucasas; Lindeman, German Foreign Commerce (concluded); Schott, Oceanography in 1895–96; Kiao-chou, Its Powerful Position and Probable Importance.

National Geographic Magazine, Washington, D. C. March, 1898. Horsford, Dwellings of the Saga-Time in Iceland, Greenland and Vineland; Hallock, Two Hundred Miles of the Kuskokwim; The Mt. St. Elias Expedition of Prince Luigi of Savoy; The Origin of French Canadians; Goode, The Height of Mt. Ranier; Geographic Work of the Bureau of American Ethnology; Babb, A Relic of the Lewis and Clarke Expedition; An Interesting Rumor Concerning Andree; Tarr, Geographic Names in West Greenland.

Scottish Geographic Magazine, Edinburgh. February, 1898. Pease, Some Account of Somali-land; Stupart, The Climate of Canada; Herbertson, The Parlous Plight of Geography in Scottish Education.

THE

JOURNAL OF SCHOOL GEOGRAPHY

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

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NOTES ON THE GEOGRAPHY OF SCOTLAND.

(I.) THE HIGHLANDS.

Scotland is naturally divided into three sections, as may be seen on any good physical map.* They are the Highlands, or moun-

*Two maps are essential for the understanding of the geography of Scotland. One is the orographical map prepared by Mr. Bartholomew, the other the geological map issued by the same cartographer under government authority, and with the supervision of Sir Archibald Geikie, Director of the Geological Survey of the United Kingdom. Both are on the scale of 10 miles to one inch. The price of the former is 1/-, on cloth 2/-, and of the latter, which is mounted on cloth, 7/6.

Two other maps on the same scale, may be found useful. The Naturalist's Map, showing cultivated land, woodland, hill, pasture and moorland, deer forests, salmon rivers, fishery boundaries, lighthouses, etc., and the ordinary political and railway map, called the Tourist's map. Price of each 1 -, on cloth 2'-. All four maps may be used as wall maps in small classes.

The Royal Scottish Geographical Society's Atlas of Scotland, prepared by Mr. J. G. Bartholomew, contains these maps, and general maps of climate, products, population and language, and others, as well as an orographical map of Scotland, on a scale of two miles to the inch, in sheets, and plans of all the principal towns. It is one of the most beautiful specimens of modern cartography, and should be in the hands of every Scottish schoolmaster, either in the school library or in his private one. It costs £3.3/-.

All these maps are published by Messrs. John Bartholomew & Co., Geographical Institute, Edinburgh. tainous northern half; the Lowlands, or Central Plain; and the Southern Uplands, or hilly regions in the south.

The explanation of this threefold division is found by comparing the physical with the geological map. The three regions correspond to a threefold division in the nature of the rocks. The rugged Highlands consist of metamorphic rocks, such as gneisses, quartzites and schists; and of igneous rocks, like granite and diorite. The Central Lowlands are made up of different series of stratified rocks of Old Red Sandstone and Carboniferous Age, with outcrops of igneous rock. The rocks of the Southern Upland are mainly stratified rocks of Silurian Age.

The lines of separation between these three distinct geological and physical regions are two parallel faults, running from southwest to northeast. It may be noted in passing that this southwesterly, northeasterly trend is a characteristic feature of Scotland, and has profoundly influenced all the physical features of the country. The boundary between the Highlands and Lowlands, one of the two great faults, passes from the south of Kintyre, through Arran and Bute, and from the mouth of the Clyde through Loch Lomond to Stonehaven on the east coast. The other and parallel fault, dividing the Lowlands from the Southern Uplands, runs from Girvan, on the west coast, to Dunbar, on the east coast.

These three divisions are fundamental, but we have to notice two anomalies. There is an area of Old Red Sandstone rocks, with corresponding lowland conditions, in the eastern Highlands, around the great gulf of the Moray Firth. There is a second area of Old Red Sandstone and Carboniferous rocks in the lower basin of the Tweed in the east of the Southern Uplands, thus continuing the Lowlands as a coastal fringe north and south. This has had an important influence on the development of Scotland, both historically and economically.

There is a well-marked difference between the scenery of the three regions, which cannot fail to strike any observant traveller on any of the railway lines which cross the two great faults dividing the Central Lowlands from the Highlands on the north, and the Southern Uplands on the south. Such a traveller would pass from the heather-clad Highlands, to the cornlands of the Lowlands (corn in Scotland meaning oats), and thence to the grassy South-

ern Uplands. The economic conditions correspond to the physical ones. Only the Central Lowlands are adapted to support a dense population. The industrial life of Scotland is concentrated in this central plain, pierced by the magnificent river estuaries of Clyde, Forth and Tay, which penetrate into the very heart of the plain and connect it with the eastern and western seas.

Physical Features of the Highlands.—The Highlands include the area of the mainland already defined and all the most important islands. Looking at islands and mainland as a whole, we note two deep parallel depressions, again running from southwest to northeast. The more westerly is completely flooded by the sea and bears the name of the Minch. The second to the east is a much narrower, and in places a much deeper depression. Its ridges, as well as its hollows, are well marked, and the sea has only partly flooded it. It runs from the Firth of Lorne to the Moray Firth, and is called Glenmore or the Great Glen (in Gaelic more means great). The southwestern part is the fiord of Loch Linnhe, beyond which low ridges separate the glen into three depressions, filled with fresh water, Loch Lochy, Loch Oich and Loch Ness, the latter deeper than any of the seas surrounding Scotland. Caledonian Ship Canal has been constructed up this glen, saving the dangerous passage by the tempestuous Pentland Firth.

The Outer Hebrides, cut off from the Inner Hebrides and the mainland by the Minch, are a plateau of gneiss cut into islands by submerged valleys, forming sounds (Norse sund, that which can be swum across). The north island is the largest, and is called the Lewis. The water gathers into numerous lakes, or lochs, in the hollows of the impervious rocks, resembling on a small scale the lake region of Finland, or that around Hudson Bay.

The Northwestern Highlands, lying between the Minch and the Great Glen, consist of gneisses or schistose rocks. Most of the mountains rise to between 2500 or 3500 feet, and are the remains of a plateau sloping slightly to the north. The west coast of this region, from lofty Cape Wrath southward, is composed of gneiss similar to that of the outer Hebrides across the Minch, and also of Torridonian and Cambrian sedimentary rocks which form some of the most picturesque regions in Scotland. The grand Cuillin Hills of Skye and the fine island of Rum and Ardnamurchan Point,

which means the headland of the great sea, and forms the western extremity of the mainland, are formed of gabbro of the same age.

Coll and Tiree are masses of granite on the eastern border of the Minch not yet submerged. Much of the island of Skye and Mull are composed of great lava flows. Fingal's Cave on the little island of Staffa west of Mull is a fine example of the regular columnar structure which basalt sometimes takes.

The southeastern Highlands, lying between the Glenmore and the fault which separates Highlands and Lowlands, form a plateau slightly higher than the one just described. Geologically they are remarkable for great masses of granite. This is red in color near Peterhead, where it forms Buchan Ness, the most easterly point in Scotland. Aberdeen granite is gray in color. Granite, mainly the gray variety, is used in building this "granite city," and both kinds are employed for paving the streets of many towns. Granite forms some of the highest mountains-Lochnagar, the highest point in the Balmoral Forest; the Cairngorm mass, culminating in Ben Macdhui, nearly 4300 feet high; the rugged and precipitous Ben Cruachan near the west coast, and the smaller and almost equally imposing Goat Fell on the island of Arran in the south. The base of Ben Nevis, the highest mountain in the British Isles, is also of granite, but the summit, which rises to 4406 feet, is of porphorite weathered into great boulders.

The view from the summit of Ben Nevis, where there is a meteorological observatory and a small hotel, is very fine, and shows the characteristics of all the mountains just mentioned. In the south and southwest, beyond the vast desolation of the moor of Rannoch, a line of quartzite and mica-schist mountains ends the view. Most important among these are the conical Scheihallion. famous as the one chosen for measuring the earth's density, by deflections of the plumb line, the massive Ben Vorlich, the twin peaked Ben More, and the rounded Ben Lomond. These mountains form the sky line of the Highland plateau as seen from the Lowlands, and suggest a continuous ridge, to which the name Grampian mountains has been given in the east.

The submerged valleys on the west coast form fiords, locally known as firths, which is another form of the same Norse word, sounds and land lochs.* The sounds are fiords joined to the sea

^{*} The ch is guttural and the word is not pronounced locks.

at both ends, and so forming straits, and the firths are larger and wider than the lochs. Among the fiords may be noted the Sounds of Sleat, Mull and Jura; the Firths of Lorne and Clyde; and Lochs of Terridon, Hourn, Fyne and Long. These deep fiords, with their exceedingly narrow or absent coastal plains, above which mountains tower from half to three-quarters of a mile form some of the most picturesque scenery of Europe.

The Highlands, as a whole, are higher in the west than in the east, and the long slope of the land is therefore to the east. The rivers flowing westward are, for the most part, short, rapid torrents. All the long rivers flow eastward, mainly in long valleys, whose prevalent direction is from southwest to northeast. But the main stream often leaves the Highlands by transverse valleys at right angles to these. This is more particularly the case on the northern and southern boundaries of the Highlands.

None of the western rivers are important, but some of the fresh water lochs are drained to the western seas. The most beautiful of these is Loch Maree, surrounded by mountains of sandstone and of schists, and dotted with islands. Another is Loch Arne, which washes the southern base of Ben Cruachan, and whose surplus waters escape to Loch Elise by the narrow and wild Pass of Brander.

The rivers entering the Moray Firth usually flow at right angles to the coast. Those in the north, therefore, run in cross valleys, such as the Shin. Those from the south, such as the Findharn, the Spey and the Deveron, rush onward in longitudinal valleys toward the northeast. The Spey and its tributaries drain the west and the north of the granite boss of Cairngorm. The Dee and many tributaries rise in the heart of this mountain mass, flow to its southern base, and then eastward to the North Sea between granite mountains. The Don runs at the northern base of the granite mass north of the Dee.

In the center of the southeastern Highlands several rivers run from the southwest, and widen into great valley lakes in their course. The Tummel, with Lochs Rannoch and Tummel, and the Tay, flowing through Loch Tay, are the most important of these rivers in the longitudinal valleys. They ultimately flow across the grain of the land in a southeasterly direction. The upper

part of this cross valley is filled by the Garry, which runs into the Tummel, which runs into the Tay. This cross valley is the great line of communication between north and south, as there is a pass, about 1,500 feet high, between the Garry and the Spey.

The waters from the southeastern slopes of the Grampians gather into the rivers of the lowland plain, and will be discussed with them. Those in the southwest of the Highlands flow through beautiful lakes. Loch Earn lies at the northern base of Ben Vorlich, and the river Earn joins the Tay. The upper waters of the Leith, which joins the river Forth, drains Loch Katrine and the other lakes of the Trossachs. Loch Lomond sends its surplus waters by the Leven to the Clyde.

Climate.—This great highland plateau, lying across the track of the southwest winds, receives a very heavy rainfall on the windward side, a relatively lower one to the leeward. Large areas on the west have a mean annual rainfall of over 80 inches, while along some sheltered regions of the Moray Firth the annual precipitation averages less that 25 inches.

Along the sea coast the temperature is never regular, especially in the west; but the average elevation is great, and hence the country is cold in winter. Snow is found in patches on Ben Nevis all the year around, although the summit is below the line of continuous permanent snow. The deep valleys, too, are often greatly chilled in the calm, frosty weather, and sometimes it is much warmer in winter on the tops of the mountains than in the low ground. From the observations at the Ben Nevis Observatories, it seems that the mountain tops have a more oceanic climate than the lower land. The observations made at the summit and at the base of Ben Nevis furnish about the most reliable data for determining the reduction of temperature with height. value of 1° F. for 270 feet was used by Dr. Buchan in preparing the temperature observations for the maps of temperature distribution published with the "Challenger Report on Atmospheric Circulation."

Plants and Animals.—The rugged, elevated nature of the ground, and the coldness of the climate, makes much of the Highlands waste land, covered with moors of peat-moss, heather or bracken, or with a scanty crop of grass, forming what is called

hill pasture. A glance at the naturalist's map shows that the only region where this is not the prevailing vegetation is on the flatter, drier regions round the Moray Firth, the lower valleys of the Dee and the Don, and in parts of Caithness. Forests originally covered much more ground than now, and many districts, like the Forest of Athole, are now almost treeless. Woods are now confined to the valleys of the rivers, where pine and birch still flourish, but they might be extended with great advantage.

More than two-thirds of Scotland consists of land which cannot be cultivated; and the largest proportion of this barren is found in the Highlands. The moorlands are used for preserving game, such as black cock and grouse. The Naturalist's map shows very graphically how great a part of the Highlands remains, or has been converted into deer forest. Deer destroy young trees, and a deer forest is a forest in name only. The increasing area of deer forest is resulting in the contraction of the sheep farming area. The hill pastures support a hardy horned variety of sheep. The Shetland sheep have very soft wool, and Shetland woolen goods are much sought after. Small ponies are reared in the Shetland and some western islands. Only along the shore of the Moray Firth and in Aberdeenshire and Caithness are there any considerable areas of arable land. In Aberdeenshire many cattle are reared.

The People and Their Occupations.—The Highlander is, like most of the inhabitants of the British Isles, of mixed race. Who the primitive inhabitants were, and how far they influence the present ones, is a problem of endless discussion. That the Keltic element has been introduced is certain from the evidence of Gaelic place names, and more particularly by the survival of Gaelic as a spoken language in the hilly regions and in the islands. It is very probable that the smaller dark types of the more inaccessible regions are pre-Keltic, although they speak Gaelic to-day, just as it is evident on looking at many Gaelic speakers of the western isles that they are descendants of Viking forefathers. The Kelts in the early centuries of our era were the cultured people of the west, and the Kelt has left an imperishable impression wherever he has passed.

The Norse element is most marked in the Shetland and Orkneys

and Caithness, where the Gaelic has never been spoken and Keltic influences are less seen than anywhere else in Scotland. But all along the east coast, and even more in the fiords and islands of the west coast, the Norse influence has been very great, and place names tell where the men of the fiords or Viks (wick) penetrated. For instance, the "ey" and "ay" in Orkney, Colonsay, and other islands, is the Norse word for island; so we should not say Orkney Islands, but the Orkneys. The Norse called the Hebrides the Southern Islands (Sudreys) to distinguish them from the islands north of Scotland, and the name is still used as part of the title of the Bishop of Man, who is called Bishop of Sodor and Man, although he has no longer jurisdiction in the Hebrides.

The Highlands are accessible by the boats round the coast, by the great glen, by such a valley as that of the Tay; but the most important land communication has been by the flatter east coast, by which the English (Angle) were able to push slowly northwards, so that in that region English, or rather Scots, and not Gaelic is the mother tongue of the people. The east coast, too, lay open to raids of Jutes as well as Angles.

The Highlands were not really opened until last century, when the Hanoverian rulers found it necessary to secure themselves from attacks by the adherents to the Stuarts. We find curious examples of this isolation of the Highlands in the religious beliefs of the people, for, in general terms, it may be said that the Reformation never penetrated at all to certain parts which remain true to the Catholic Church to-day, while others were only reached by the first waves of the reform movement, and are Episcopalian. The majority of the people, however, are Presbyterians.

The humorous popular rhyme,

"If you'd seen these roads before they were made You'd bless the name of General Wade;"

as well as places with names such as Fort William, Fort Augustus and Fort George, in the south, centre and north of Glenmore, remind us that the Highlands were not opened up until the middle of last century.

The Highlands of Scotland give us a very good example of the distribution of simple occupation. The sea yields fish; the lower

ground, especially that round the Moray Firth, can be cultivated; the hillsides have scanty pasture for sheep. Fishing on the coast, farming on the lowland, and shepherding on the hillsides are the chief occupations of Highlanders. On the west coast, where the coastal plain is usually very narrow, and the hillsides very steep and bare, the same family must have recourse to all these occupations to obtain a bare subsistence.

The great centres are, therefore, fishing ports. The chief towns of all the islands, from Islay to the Shetlands, may be grouped under this heading; as well as Wick, Fraserburgh, Peterhead and Aberdeen on the mainland. The chief fish caught are herring, cod and haddock; and steamers and trains are run to carry the fish to the great towns in the south. The fish that cannot be disposed of fresh are smoked or salted. There are many minor fishing villages, especially round the Moray Firth, and in the Clyde Sea Area (the Firth of Clyde and all the fiords opening out of it). Oban is a great natural centre, communicating now by railway with central Scotland, and by steamer south, west and north. may be termed the Capital of the Western Highlands; just as Inverness is the Capital of the Northern Highlands, a town at the northern end of the Great Glen, with easy land communication north, west, south and east, and an open sea to the northeast. several small country towns such as Elgin, Keith, Huntly, Aboyne in the cultivated regions of the northeast. Aberdeen is the only really large town in the Highlands. It lies where the Dee and the Don reach the sea, not far from the boundary between Lowlands and Highlands, and is the key to the passage and the north. granite quarries are close at hand, and considerable manufacture Many of the fishing villages of the Clyde Sea Area is carried on. are growing to be fashionable waterplaces; such as Dunoon on the mainland, and Rothesay on the island of Bute.

The only manufacture of importance in the Highlands is the distilling of whiskey from barley malt. In many cases a peculiar flavor is given to the whiskey by the "peat reek" or smoke of burning peat (dried moss). The island of Islay, Campbelton in Kintyre, and Speyside are among the most important whiskey producing regions.

As the Highlands have been opened up, they have attracted an

increasing number of visitors every year, who find in the bracing air and magnificent scenery a brief spell of recreation after the long weeks of city life. The Highland tourist season is short; more of the visitors come in the rainy season of July, August and September, instead of the drier months of April, May and June. Another phenomenon must be mentioned, namely, the brief annual visit of the wealthier classes who rent the moors, deer forests and salmon fishing, from the landlords. Unfortunately, it is believed to pay better to increase the deer forests than to encourage sheep breeding, and a comparison of recent maps with those of the old ordnance survey shows how greatly the inhabitated area of the Highlands has decreased with the growth of deer forests in the last half century. We have here a phase of evolution which must always attract the attention of the thoughtful geographer, whether it takes place in the wilds of Africa, or in the Far West of America -people of a different stage of civilization ousting the holders of the land.

A. J. HERBERTSON.

COLINTON, Midlothian, Scotland.

THE EQUIPMENT OF A GEOGRAPHICAL LABORATORY.

HOLYOKE, MASS., Nov. 30, 1897.

TO THE EDITOR OF THE JOURNAL OF SCHOOL GEOGRAPHY:

I enclose herewith an outline plan drawn to scale of the room available for my proposed physiographical laboratory in the new High School building at Holyoke. It is possible to devote it exclusively to the one use, and I have an appropriation for its proper equipment, in addition to that needed for ordinary desks or chairs. I should be obliged for any suggestions that you can make to aid me in furnishing it to best advantage.

Very truly yours, J. T. Draper,

Master in Science, Holyoke High School.

The following reply to Mr. Draper's inquiry has been sent to him. It is here printed, in the hope that it may also serve other

teachers who are equipping school rooms with especial regard to teaching geography. It is certainly most encouraging to learn that a room of good size in a new high school is to be devoted entirely to geography, and that a liberal appropriation is allowed for its equipment.

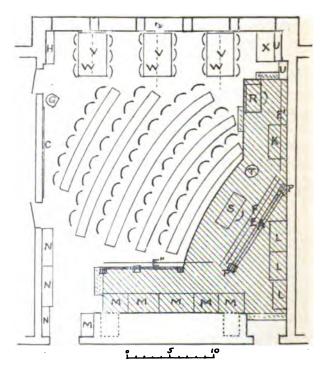
The leading idea in these suggestions is to furnish a room similar to the one described by Mr. Draper so that every thing used by teacher and pupils shall be arranged as compactly as possible, close to the place where it will be needed. The labor of carrying materials about may be thus much decreased, and the materials will be correspondingly well used. It should be understood that many modifications of the suggestions are possible; for example, if lectures and lantern illustrations are given in a general lecture room, part of the equipment here described could be dispensed with, and the arrangement of platform, etc., would be altered. If the funds available in a single year will not suffice to buy all that is recommended, several years may be devoted to completing the equipment.

The windows should reach well towards the ceiling, in order to let sky light reach as far back into the room as possible. If the windows have a south exposure, sunlight may be used for lantern projections, and noon-altitude observations may be made in the room. In this case, the out-door thermometers (\$0.75 to \$8.00) must be exposed elsewhere. If the windows look to the north, a light frame for out-door thermometers can be attached to the wall of the building; and observations of the sun must be made in the school yard.

Daily weather maps, sent free to schools from the nearest printing station of the United States Weather Bureau, should be posted in the room at a convenient place, or in the neighboring corridor, where they can be more generally inspected. Two roller shades to a window, one descending from the top, the other rising from the bottom, allow an easy control of light at tables and seats. Opaque shades or shutters for darkening the room when the lantern is used are indispensable. It is manifest that some other means than the windows must be provided for ventilating the room.

During lectures and recitations, a class of about forty may be seated in easy view of maps, diagrams, or lantern projections. The

racks and frames that hold maps, etc., are set obliquely and brought forward from the back of the room; thus placing them in good light, leaving the darkest part of the room for storage, and bringing the window light over the left shoulder of the pupils. The shaded port of the room is a platform, raised about a foot above the floor. Its heavy front line represents a rim, about an inch high, to prevent tables (see below) from being pushed off the platform. Near the doors at the back of the room, and near the teacher's record desk, R, steps give easy access to the platform. A globe stands near the front of the platform. A number of small globes (cost 25 cents each) may be kept in one of the cases, M, at the back of the room. They are of much value in the hands of the scholars when studying certain problems of distribution.



The blackboard, A, set between posts, P, P, is for the teacher's use. It should rise and fall like a window sash, being counterbalanced

by weights inside the posts. Two or three blackboards may be placed here, one in front of the other. One of the boards should then have an outline map of the world (Mercator projection, with equator across middle of board) painted on it, for use in illustrating various problems of distribution. The back of the same board may have an outline of the United States painted on it; the board can be reversed by unhooking it from the weight cords, and turning it end for end. The object of having the blackboards to rise and fall is that, by pushing them all up to the ceiling, the platform is cleared of obstruction when materials are brought forward from the cases along the wall.

A blackboard for use by the pupils is provided at B; this one rising and falling like the board at A. A third blackboard may be attached to the wall at C. Close in front of the blackboard, A, is a light rack, E, hung by cords over pulleys in the ceiling. Similar racks hang at E' and E''. The racks may be lowered to a convenient position when maps are to be hung on them. hoisting cords may be belayed on hooks on the blackboard posts. Each rack should be eight or ten feet long, about a foot wide, and of light, open frame. The upper edge of the top and bottom rack strips should be rabbeted to a little less than quarter of an inch thick, so as to catch S-hooks, or spring clothes-pins for hanging Tack driving should be avoided, as being destructive, troublesome, and noisy. Clothes-pins cost less than a dollar a S-hooks can be made of rather stiff copper wire by any tinman: the shank between the turned ends should be about an inch long; the hooks should be large enough to catch on the rabbeted strips. Eyelets set in the corner of sheet maps, diagrams, etc., form convenient means of attaching them to the racks by means of the S-hooks. Clothes-pins do about as well, but are more "in the way." Roll-maps backed with cloth and mounted on sticks, top and bottom, should have two rings fastened by tape to the upper stick, so that they can be attached to the racks by The three racks, E, E', E'', are set on a broken line, so as to catch the light and face the class. They will be found increasingly useful as the collection of maps and diagrams grows. The general absence of convenient hanging racks in schools to-day indicates that laboratory and lecture materials for teaching geography are rarer than they should be.

The screen or curtain for projections, F, is mounted on a strong spring roller at the ceiling. It can be drawn down in front of the racks and blackboards when wanted, and rolled up out of the way when not in use. The end of the room is not a good place for the lantern projections; for then the seats will be so arranged that the scholars must sit with their backs to the windows during daylight work. The lantern, G, is set square opposite to the screen, A case, H, near the lantern, holds the slides. Good slides cost from 40 to 50 cents apiece, or \$30 to \$40 a hundred. are best kept on edge in covered boxes. The boxes should have slots on the side, or cross divisions, and a number opposite each slot or division; corresponding numbers are written on the label of slides; they can thus be easily returned to the proper place after For geographical slides, a classification by countries is to be preferred. Time is saved by making record of the numbers of such slides as are used for illustration of a given subject; the same slides can then be taken from the boxes by a student assistant whenever they are wanted. The lantern operator should be trained never to make finger marks on the face of the slides. many good lanterns now on the market, at prices from \$50 to \$100, The most luxurious are those which use an electric are light so powerful that the room need not be entirely darkened while the pictures are shown. The pupils can then take notes during Lantern slides in the stock of dealers are heterothe exhibition. geneous. It is difficult to select a systematic teaching collection from them. A small set for elementary physiography was prepared several years ago from the Gardner collection of geological and geographical photographs in Harvard University, for the use of the Cambridge public schools; and an explanatory list of the slides was printed in the report of the Cambridge school committee The slides corresponding to the list may be had of E. E. Howell, 612 17th street, Washington, D. C. Additional series of slides selected for use in connection with systematic teaching are greatly needed.

Good storage space is found at the back of the platform, at K. L, L, M, M, M, where cases, shelves and racks can be set. More case room should be provided than can be used at first, to give opportunity for the natural growth of laboratory materials.

Additional shelves or wall racks can be set at N, N, when needed. The cases L, L, should contain among other things specimens of minerals and rocks such as are needed in physiography; a small variety of samples being sufficient for elementary work. It will be found advantageous to arrange the minerals and rocks in the drawers of cases set on castors, so that they can be rolled out on the forward part of the platform when wanted; the lecture table ordinarily standing there being for the time rolled back out of the way. A great saving of troublesome transportation may thus be effected. Cases M, M, should be used for map sheets and models (see below) and for "stores," such as colored chalks, outline maps for pupils' exercises, S-hooks, clothes pins, etc.

Wall maps should be rolled up, tied, and laid away on wall racks when not in use. It is a serious mistake to expose any one map constantly before a class; its facts become very stale if they are constantly in sight. Such wall maps as are very frequently needed may be attached to the ceiling on spring rollers, in front of the racks, E, E', E''; they can then be pulled down for use at any time, and quickly rolled up out of the way. The set of wall maps should include the world on Mercator projection, the hemispheres, the grand divisions, the United States and, if possible, a good State map. The Kiepert maps published by Reimer, of Berlin, the Habenicht-Sydow maps published by Perthes, of Gotha, the Chavannes maps published by Hölzel, of Vienna, are all good. Besides these, special mention should be made of certain excellent maps of foreign countries, as follows: Stereographical Map of the British Isles, Stanford, London, 1885; Carte Physique de la France, prepared by Guillemin and Paquier, published by Suzanne & Harvez, Paris; Physical Maps of the Countries of Europe, published by Reimer, Berlin, 1888 (these may be had with or without names); Randegger's Alpenland with the Bordering Districts of Central Europe, published by J. Meier, Zurich, Switzerland (this may be had with names and political boundaries, or with only mountains and rivers, the latter form making a very beautiful wall map); Wandkarte der Alpen, by V. von Haardt, published by Hölzel, Vienna, 1882.

All wall maps that are to be rolled and stored on wall racks or shelves should have their names printed upside down along the top

edge of the back of the map. When rolled and lying on the rack, the name is in sight, right-side-up; when taken from the rack and unrolled, the map will be face out and right end up. It is often convenient to hook a map on a rack before untying and unrolling it.

The topographical map sheets published by the United States Geological Survey are now simply indispensible for the progressive There is nothing else, short of travel, by which the actual matter of fact about our country can be so well shown. selection of useful sheets, with brief explanatory description may be found in "Governmental Maps for Use in Schools" (Holt, New York, 35 cents), a little book prepared by three members of the Conference on Geography appointed by the "Committee of Ten" several years ago. A catalogue of the sheets now published by the United States Geological Survey may be had free on application to the Director of the Survey, Washington, D. C. tion about the manner of ordering maps is given in this JOURNAL for September, 1897. Teachers who wish special information about the selection of map sheets for particular districts, or for the illustration of particular geographical features, may address the Editor of the JOURNAL, and reply will be made as promptly as possible. It may be said in general that every school should certainly have all the maps published of its own State. area of a few States has been mapped. Of these, New Jersey and Rhode Island have distributed sets of maps to all their public schools and libraries. Massachusetts and Connecticut are also mapped, but they have not yet followed the good example set by their smaller neighbors. Within the past year or two the undersigned has prepared brief articles on the "Use of the State Map in Grammar and High Schools," for the State Boards of Education of Connecticut, Rhode Island, Massachusetts and New York. A limited number of reprints of these articles is still on hand, and will be sent to teachers in the States named, on application.

Map sheets should be kept in heavy brown paper folders, of a little larger size than the sheets. They should be stored in a case having a number of light shelves at small vertical intervals; and on the front edge of each shelf, the name of the states there placed may be printed. As these sheets may be had at two cents apiece,

by the hundred, or five cents each for smaller orders, it is manifest that expense cannot be the obstacle to their use where they are not found.

Topographical map sheets are made more useful when a group of contiguous sheets is backed with cotton cloth and mounted, with roller sticks at top and bottom. Map mounting requires some practical skill; if no professional map mounter is accessible, an expert may often be found in the local county surveyor's office. Thus prepared, the grouped maps are more handy for use, and the larger area that they include is more effective in teaching. But their detail is such that they can not be well seen at a distance of more than five or ten feet, and they are most effective when conveniently exposed for individual study after general explanation by the teacher before the class as a whole. The following are examples of grouped sheets, and may be strongly recommended:

The Allegheny ridges of middle Pennsylvania; Sunbury, Shamokin, Catawissa, Millersburg, Lykens, Pine Grove, Harrisburg, Hummelstown and Lebanon sheets, Pennsylvania.

The drowned valleys of the coastal plain of Maryland; Brandywine, Prince Frederick, Sharps Island, Wicomico, Leonardtown, Drum Point, Mt. Ross, Piney Point and Point Lookout sheets, Maryland.

The dissected plateau of West Virginia; Charleston, Kanawha Falls, Nicholas, Oceana, Raleigh and Hinton sheets, W. Virginia.

The drumlin district of southern Wisconsin; Madison, Sun Prairie, Waterloo, Evansville, Stoughton, Koskonong and Whitewater sheets, Wisconsin.

The Canyon of the Colorado; St. Thomas, Mt. Trumbull, Kaibab, Echo Cliffs, Camp Mojave, Diamond Creek, Chino and San Francisco Mountain sheets, Arizona.

Our Coast and Geodetic Survey also publishes many excellent maps of the coast: but they are larger and much more elaborate than those of the Geological Survey, and their cost is greater. A free catalogue of these maps may be had on application to the Superintendent of the Coast Survey, Washington. The catalogue contains outlines of the map sheets, showing their location along the coast. Some suggestions of the more interesting sheets are given in the book above named on "Governmental Maps." As

these sheets are large, they should be backed and rolled, rather than kept in portfolios. Among the most useful recent additions to the Harvard collection are several long rolls, showing the peculiar features of our Atlantic and Gulf coast, made by grouping sheets, Nos. 145–151 (Cape Hatteras to Cape Fear), 153–155 (S. Carolina coast), 160–162 (Cape Canaveral), 205–207 and 210–212 (Texas coast). Sheets 194 and 195, showing the lower Mississippi and its delta, are of great value. Many other groups of sheets might be named. Much blank paper, necessary for navigators who use these sheets, may be trimmed off before mounting them.

Among many other valuable publications mentioned in "Governmental Maps," none deserves more extended use than the famous map of the Alluvial Valley of the Mississippi River, published in eight sheets by the Mississippi River Commission (office in St. Louis; price of entire map, forty cents). The Pilot Charts of the North Atlantic Ocean, published monthly by the U. S. Hydrographic Office, Washington, D. C., are worth much more than their cost (ten cents).

Grouped sheets of foreign surveys are of as great value as those of our own country. A specific account of a number of groups with details as to cost, and with explanation of their physiographic features, was published in the *Chicago Journal of Geology* (IV., 1895, 484-513), under the title "Large Scale Maps as Geographical Illustrations." A limited number of reprints of this article may be had of the undersigned by teachers who propose to begin a collection of foreign map sheets. My own method in making such a collection is to add something to it each year; thus in five or ten years it attains a considerable size, and the annual expense is moderate.

Photographs and pictures from magazines and illustrated papers may be made to serve an excellent purpose, if they are carefully selected, systematically classified and labelled, and properly exposed for study. Seven pictures of Kilauea in Professor Libby's article in *Harper's Magazine* for October, 1897, will cost five cents each; four are wasted on account of "backing," some of the others are not counted, and nothing is said of the many portraits of chemists that might, for a time at least, adorn another laboratory. Pictures from magazines and papers should be pasted upon rather stiff

brown paper, cut in sheets of uniform size. Reference to the source of the pictures should always be noted. Materials of this kind are best kept in stiff portfolios in a case with vertical divisions; case K being conveniently placed for the purpose. Some of the more attractive pictures may be used as wall decoration; thus giving the room an appearance of being lived in and enjoyed. A committee of the Geography Club of Boston is at present engaged in making a classified list of material of this kind. Some account of their results may be given at a future time.

Geographical models are of much value, but at present few of them are to be had. Models of the United States and of various states, made by E. E. Howell, Washington, are expensive, but are worth their cost. They are large and heavy, and should be fixed against the wall; as behind the rack, E', or replacing the blackboard, C. A series of typical land forms, to be known as the Harvard Geographical Models, is in process of design and construction in my laboratory, where Mr. G. C. Curtis has completed three numbers of the series. The models measure 24 by 18 inches, and are four or five inches high. One of them represents a mountainous region decending to the sea; second, the same region after a depression of the land, whereby the sea has entered some distance into the valleys and converted them into branching bays; a third, the same region as the first, but now moderately elevated so that a belt of smooth sea bottom is brought to sight as a young coastal plain. An account of these models, reprinted from the Proceedings of the Boston Society of Natural History, with heliotype illustrations, may be had of the Secretary of the Society (25 cents). Several sets of casts of the three models have been disposed of to schools and colleges. My own measure of their educational value may perhaps be prejudiced, but I am free to say that I find them of great service in my winter and summer courses in physiography. New members of the series will be added as fast as possible; but at present Mr. Curtis' time is fully occupied in making duplicate sets for sale.

Among foreign models, the best for teaching are four by Heim, of Zurich, representing an Alpine mountain, with snow fields and glaciers; an Alpine torrent; a volcanic island; and a cliff and dune coast. These are for sale by J. Meier, of Zurich, costing

about \$20.00 each, without transportation or duty. They are most excellent models, and it is to be regretted that they are so expensive. A relief of Italy on true vertical scale and on true earth-curved surface has been made by Pomba, and published by Paravia, of Milan. There are various others that might be mentioned. An account of the various geographical models exhibited in the World's Fair, Chicago, was written by Marcus Barker, of the U. S. Geological Survey, and published in the Bulletin of the Philosophical Society of Washington, Vol. XII., 1894, 349-368.

Pictures and diagrams especially prepared for geographical teaching are lamentably scarce. The best of this kind is the series of Geographische Charakter-Bilder, published by Hölzel, of Vienna. (See p. 199.) Thirty-seven numbers of this series have now appeared. A special series giving colored views of important cities come from the same publisher. Lehmann's Typical Landscapes are also of value; but they are more exclusively European than Hölzel's.

Books of reference may be kept in cases near the teacher's desk, at U, U. A list of reference books for teachers and pupils appears in this number of the JOURNAL.

Working tables, W, W, W, stand at the windows, giving seats in the room here planned for eighteen pupils at once. is not large enough for regular laboratory work, if the course in physical geography becomes well established and generally at-Indeed, the room is already crowded with its proposed tended. But inasmuch as a geographical laboratory in a equipment. high school is to-day as much of an innovation as a physical laboratory was a few years ago, it may be difficult at once to secure more room; and the best use must, therefore, be made of what room can be had. The intention of the tables by the windows is to give opportunity for individual study of pictures, maps, models, etc., from which sketches, diagrams, models, and notes may be made by the pupils. Maps and pictures may be exposed immediately over the surface of the tables on racks let down from the ceiling by cords, and indicated by dotted lines, V, V, V. hung in this position are well lighted, and yet cut off very little light from the room. Models may be laid on the tables, or tilted up for better seeing on supports made for the purpose.

wax, pulp, or sand, used for modelling, may be kept along with modelling boards and tools in case X near the working tables.

The teacher will find it convenient to make page-margin notes of illustrative materials appropriate to various chapters and paragraphs of the text-book in use. Such notes will some day be superseded by a Laboratory Manual of Geography; but that may still be some years in the future. The only important piece of apparatus for which no space is found in the room of the Holyoke plan is a tank, four or five feet square, in which many imitative experiments may be made in illustration of the development and explanation of land forms; but as the practical use of such a tank has not yet been worked out, its omission for the present is not so serious as it will be ten years hence.

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MODED

THE BETTER BOOKS IN SCHOOL GEOGRAPHY.

The appended lists are in answer to the question: What are fifty of the best books to be used in the study of geography in elementary schools? The answer is not supposed to include a list which is above criticism; others would undoubtedly make quite different lists; but at least it offers a working basis that may be changed to suit individual needs.

The list includes books of method, text-books and books of reference, intended not for the use of teachers alone, but also for the use of pupils, especially in the higher grades.

The comments only aim to give an idea of the character of the books in as concise a manner as possible. It is hoped that the suggestions thus set forth may be helpful to teachers intending to add to their school libraries.

For the further convenience of purchasers, accurate net prices have been obtained from the book department of the Harvard Coöperative Society.

This list has been examined and criticized by Professor Wm. M. Davis and the *Editor*.

FOR PRIMARY SCHOOLS.

Method.

Child and Nature. A. E. FRYE. Ginn & Co., Boston, 1896. 216 p., 8°. 75 cents, net; postage, 10 cents.

A presentation of the advantages of sand modelling, with careful instructions as to modelling and map drawing. The illustrative lessons, which are written out in detail, are almost entirely confined to physical geography and natural history. Valuable for its history and survey of the subject.

The Teaching of Geography. A. GEIKIE. Macmillan, New York. 1887. 202 p., 8°. 65 cents, net; postage 6 cents.

The book contains a broad view of the scope of geography, and presents the necessity of liberal preparation on the part of the teacher. It is scientific, practical and not too detailed. The suggestions in regard to teaching the use of maps and home geography are especially valuable.

Field Work in Nature Study. WILBUR S. JACKMAN. A. Flanagan, Chicago. 1897. 128 p.

A very attractive book, showing how to teach the elements of geography out of doors.

Text-Books.

Primary Geography. A. E. FRYE. Ginn & Co., Boston, 1894. 136 p., small 4°. 55 cents, net; postage 15 cents.

An elementary topical study of the earth as a unit. General facts are presented, details omitted. The idea of the earth ridge rather too much insisted upon. Full of good illustrations which are especially interesting to children. A valuable book.

Natural Elementary Geography. JACQUES W. REDWAY. American Book Co., New York. 1897. 144 p., small 4°. 55 cents, net; postage 12 cents.

Land forms and man, in their relations to each other, are the two main objects of study. Lessons are well developed and well illustrated throughout. The idea of correlations and comparisons is a good one. Lessons on the ocean very short. A good teaching book.

Elementary Lessons in Physical Geography. A. Geikie. Macmillan, New York. 1897. 363 p., 8°. \$1.05, net; postage 10 cents.

Elementary but comprehensive, language simple, style clear. A few effective experiments described. Classification of sea movements very good.

Reference Books.

First Book of Physical Geography. R. S. TARR. Macmillan, New York. 1897. 368 p., 8°. \$1.05, net; postage 15 cents. In most respects a good view of the subject, especially on the geological side, but too astronomical and too physical. Treatment of land forms good, though process receives too much attention in proportion to the forms themselves.

The Earth and Its Story. ANGELO HEILPRIN. Silver, Burdett & Co., Boston, 1896. 267 p., 8°. 95 cents, net; postage, 10 cents.

A simple, clear and satisfactory presentation of the elements of geology. Within the comprehension of the younger pupils, and not beneath that of older pupils. Geological forms and processes taught by comparison with known form and common observed processes. Illustrations good, and reading matter interesting.

General Geography. H. R. MILL. Macmillan, New York, 1889. 380 p., 8°. 85 cents, net; postage, 10 cents.

A convenient reference book for pupils. Descriptive rather than explanatory; little space devoted to physical geography; matter interesting, style clear and concise.

Science Primer IV. Physical Geography. A. GEIKIE. D. Appleton & Co., New York, 1876. 140 p., 12°. 32 cents, net; postage, 3 cents.

Elementary, explanations clear and adapted to children. Illustrations are drawn from everyday things.

FOR GRAMMAR SCHOOLS.

Method.

Methods and Aids in Geography. CHARLES F. KING. Lee and Shepard, Boston, 1889. 512 p., 8°. \$1.15, net; postage, 15 cents.

A valuable handbook for teachers of all grades, with very detailed records of actual experiences; contains good lists of books. How to Study Geography. Francis W. Parker. D. Appleton & Co., New York, 1896. 400 p., 12°. \$1.10, net; postage 15 cents.

An outline of a course of lessons to be presented. Suggestions good; pedagogical side made very prominent.

Teacher's Manual of Geography. JACQUES W. REDWAY. D. C. Heath, 1892. 173 p. 46 cents.

A very useful and suggestive manual, particularly in reference to mathematical geography and disputed points. Full of common sense.

Special Method in Geography. CHARLES A. McMURRY. Public School Publishing Company, Bloomington, Ill., 1895. 202 p.

A very valuable series of considerations applicable particularly in the Mississippi Valley, and showing how to emphasize "home geography" and commerce.

Text-Books.

Complete Geography. A. E. FRYE. Ginn & Co., Boston, 1895. 208 p., 4°. \$1.20, net; postage, 25 cents.

A much approved presentation of the subject; treatment of land forms more extensive and better than in most other books of its kind. Illustrations numerous and good; explanations given very clearly.

Natural Advanced Geography. REDWAY and HINMAN, American Book Company, 1898. The latest book for grammar schools. Written with great care, and appears very attractive. Will be reviewed next month.

Short Studies in Nature Knowledge. WILLIAM GEE. Macmillan, New York, 1895. 313 p., 8°. \$1.05, net; postage, 15 cents.

Descriptive rather than explanatory; physiographical form, as scenery, is especially emphasized; elements of form are not shown in systematic relation, but on the whole an attractive presentation.

Tildens' Commercial Geography. LEACH, SHEWELL & SAN-BORN, Boston, 1891. 190 p. \$1.25.

The best of American reference books on this subject.

Longmans' School Geography for North America. Longmans, Green & Co., New York, 1891. 384 p., 8°. \$1.05, net; postage, 15 cents.

The arrangement is good, the treatment serious, and questions scholarly. Presentation of climate is excellent. In treatment of tides, currents and winds there is very little explanation. Book is rather weak on the physiographic side, but well equipped on the historical side, and contains a mine of information.

Reference Books.

Elementary Physical Geography. RALPH S. TARR. Macmillan, New York, 1895. 480 p., 8°. \$1.30, net; postage, 20 cents. Explanations on the whole clear, simple and scientific; some effective diagrams; illustrations numerous and good.

Eclectic Physical Geography. Russell Hinman. The American Book Co., New York, 1888. 382 p., 8°. 90 cents, net; postage, 10 cents.

Definitions, descriptions and explanations are concise and clear. The explanations of currents, emphasizes the effect of salinity and temperature and minimizes the influence of wind. The book is too comprehensive; does not recognize limitations of subject, but includes physics on the one side, and biology on the other, as such, and not in their relation to physiography. The American physical geography that is most cordially endorsed abroad.

The Beauties of Nature. SIR JOHN LUBBOCK. Macmillan, New York, 1892. 425 p., 8°. 94 cents, net; postage, 15 cents. A thoroughly sympathetic description of natural forms, plant and animal life.

Lessons in the New Geography. Spencer Trotter. D. C. Heath & Co., Boston, 1895. 182 p., 8°. 90 cents, net; postage, 10 cents.

Special treatment of the influence of geography upon life. One special point of interest is the effect of geographical forms on distribution of the races. Plan of the book excellent, but not fully carried out.

Commercial Geography. E. C. K. Gonner. Macmillan, New York, 1894. 205 p., 8°. 55 cents, net; postage, 10 cents.

Treats of the effect of topography upon natural productions and hence upon commerce, first in a general way and then in a more specific way under each country.

The Story of Our Continent. N. S. SHALER. Ginn & Co., Boston, 1892. 290 p., 8°. 70 cents, net; postage, 10 cents.

A clear, simple statement of geological history of North America and a good description of present conditions; little explanation; the first chapter suggests the value of minute observation of our immediate surroundings. A book full of suggestion.

Nature and Man in America. N. S. Shaler. Charles Scribner's Sons, New York, 1891. 290 p., 8°. \$1.05, net; postage, 10 cents.

An interesting and striking account of the way in which the geographic conditions of the earth's surface act upon man; presented more in detail in regard to North America than any of the other continents. Full of suggestion to teachers of history as well as geography.

Sea and Land. N. S. Shaler. Charles Scribner's Sons, New York, 1894. 252 p., 8°. \$1.75, net; postage, 25 cents.

An excellent guide book for one who would "interrogate nature." Teaches the student how to observe and how to reason from the facts observed. Special chapters on Beaches, Icebergs, Harbors, Harbors and Civilization, which are full of minute and careful description. Illustrations excellent.

Aspects of the Earth. N. S. SHALER. Charles Scribner's Sons, New York, 1889. 344 p., 8°. \$1.75, net; postage, 25 cents. Popular rather than technical, interesting, clear, beautifully illustrated. Chapters of special interest are: Caves, Rivers and Valleys, Forests, and Formation of Soils.

The Mountains of California. JOHN MUIR. The Century Co., New York, 1894. 381 p., 8°. \$1.10, net: postage, 15 cents. A sympathetic rather than scientific description of the Sierra

Nevada Mountains and of the life there; full of true out-door feeling. In explaining forms, too much emphasis is laid on glaciation. A fascinating book for general readers.

Distribution of Animals. Angelo Heilprin. D. Appleton & Co., New York, 1887. 435 p., 12°. \$1.50, net; postage, 15 cents.

Treats of the distribution of animals in the past and present. More geological than geographical.

- Stanford's Compendium of Geography and Travel. EDWARD STANFORD. Charing Cross, London. Deserves to be in every library.
- Europe. F. W. Rudler and G. C. Chisholm. New edition in preparation in two volumes. \$7.65, net; expressage extra.
- Asia. A. H. Keane. 1896. Two volumes. \$7.65, net; expressage extra.
- Africa. Keith Johnston. 1895. Two volumes. Vol. I., 639 p.; Vol. II., 671 p.; 8°. \$7.65, net; expressage extra.
- North America. HAYDEN and SELWYN. 1887. One volume published, 719 p., 8°. Vol. II. in preparation. \$3.85, net; expressage extra.
- Central America, West Indies, South America. H. M. BATES. 1895. 571 p., 8°. \$7.15, net; expressage extra.
- Australia. A. R. WALLACE. 1894. Two volumes. \$7.65, net; expressage extra.

A complete and convenient set of reference books; valuable for quantity of illustration. Each book contains a description of the geology, natural features, climate, productions, and people of the country under discussion. Treatment varies but little throughout the series.

FOR HIGH SCHOOLS AND TEACHERS.

Text-Books.

The Realm of Nature. H. R. MILL. Charles Scribner's Sons, New York, 1895. 366 p., 8°. \$1.15, net; postage, 15 cents.

A book for the teacher rather than the pupil. Contains good material, carefully selected; but is too compressed and covers some subjects that are out of reach in school. Illustrations very suggestive and treatment of map projections excellent.

Elementary Meteorology. Frank Waldo. American Book Co., New York, 1896. 373 p., 8°. 90 cents, net; postage 15 cents.

Contains the elements of meteorology clearly set forth.

Elementary Meteorology. WILLIAM MORRIS DAVIS. Ginn & Co., Boston, 1894. 355 p., 8°. \$2.30, net; postage, 20 cents. A very inclusive book, somewhat difficult to read, but of great

value to teachers of weather phenomena.

Studies in Indiana Geography. CHARLES R. DRYER, Editor. The Inland Publishing Co., Terre Haute, 1897. 113 p., 8°. \$1.15, net; postage extra. Cheap edition, 45 cents, net; postage, 5 cents.

A book valuable especially because of its aim to provide local material. Such books for each state would make a very valuable series.

Reference Books.

Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading. H. R. Mill. Longmans, Green & Co., New York, 1897. 94 cents, net; postage. 6 cents.

A valuable bibliography of geographical books, prepared es pecially for teachers in Great Britain, but very useful also for teachers on this side of the Atlantic. Gives only the best and summarizes each book noted.

Applied Geography. J. Scott Keltie. George Philip & Son, London, 1890. 160 p., 8°. \$1.05, net; postage, 8 cents.

The book traces the influence of topography upon the development of a nation in an interesting manner. It is mainly devoted to the English people and the development of the British Empire; but the opening chapters are general in character. It would be well if the same questions were worked out in detail for the United States.

Handbook of Commercial Geography. George C. Chisholm. Longmans, Green & Co., New York, 1889. 515 p., 8°. \$3.00, net; postage, 20 cents.

A systematic presentation of the effect of geographical conditions on commerce, shown in detail in each country.

National Geographic Monographs. American Book Co., New York, 1895. 8°.

A series of ten monographs on interesting subjects, scientifically treated. Valuable sources of material for teachers. Ten numbers bound together in cloth. \$2.25, net; postage extra.

Lakes of North America. ISRAEL C. RUSSELL. Ginn & Co., Boston, 1895. 125 p., 8°. \$1.40, net; postage, 15 cents.

A thoroughly scientific presentation of the subject, clear, interesting, comprehensive and very attractive.

Glaciers of North America. ISRAEL C. RUSSELL. Ginn & Co., Boston, 1897. 210 p., 8°. \$1.65, net; postage, 15 cents.

The book opens with an introductory discussion of the general characteristics of glaciers and of the records they leave. This is followed by a description of glaciation in North America. Last chapter very ingenious and attractive.

Volcanoes of North America. ISRAEL C. RUSSELL. Macmillan, New York. 346 p., 8°. \$3.00, net; postage, 24 cents.

Subject matter of interest and value presented in most attractive form and style. Like the two just mentioned, it is thoroughly delightful.

Island Life. Alfred Russell Wallace. Macmillan, New York, 1892. 563 p., 8°. \$1.30, net; postage, 15 cents.

Part first treats of the general distribution of animals and the influence of physiographical form on such distribution. Part second treats of island life in particular; effect of isolation brought out strongly. Zoölogical and geographical.

Geographical Distribution of Animals. Alfred Russell Wallace. Harper Brothers, New York, 1876. Vol. I., 503 p.; Vol. II., 697 p.; 8°. \$7.00, net; expressage extra.

On the whole more zoölogical than geographical. Not as the author puts it, zoölogical geography, but geographical zoölogy.

The Earth as Modified by Human Action. George Perkins Marsh. Charles Scribner's Sons, New York, 1874. 656 p.; 8°. \$2.60, net; postage 22 cents.

Permeated by a doctrine concerning the influence of forests on rainfall, now thought to be erroneous; but contains many interesting examples and emphasizes a side of geography not fully treated in other books.

The Scenery of Scotland. A. Geikie. Macmillan, New York, 1887. 481 p., 8°. \$2.60, net; postage 20 cents.

Clear, accurate, scientific and interesting to the untrained reader as well as to the trained geologist or geographer. The connection

raphy.

of present topography with the geology of the past is drawn in a way that is convincing and exceedingly interesting. Introductory accounts of erosive processes among the best to be found. It is the best book of its kind published.

The Scenery of Switzerland. SIR JOHN LUBBOCK. Macmillan, New York, 1896. 371 p., 8°. \$1.10, net; postage 15 cents. Detailed and geological treatment valuable for study. Contains many sections and also a good exposition of mountain-building, glacial action, valley formation, the origin of lakes, and a clear explanation of elementary geology so far as it influences topog-

The United States. J. D. WHITNEY. Little, Brown & Co., Boston, 1894. Two volumes. Vol. I., 472 p.; Vol. II., 324 p., 8°. Out of print. Second-hand copies may be found at varying prices. To be found in part in Encyclopedia Brittanica, ninth edition.

Vol. I. A description of the geology and topography of each region of the United States and the effect of form on climate; together with an account of forests and mineral resources. A valuable source of information for the teacher.

Vol. II. Describes the geological conditions underlying the great natural regions of the country and the resulting influences upon forests, water supply and population.

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Bulletin of American Geographical Society. New York.

\$4 a year; 5 nos.

Geographical Journal. London. \$5.50 per annum; * monthly.

* Much reduced rates to subscribers to this JOURNAL.

Scottish Geographical Magazine. Edinburgh. \$4.50 per annum; monthly.

There are many attractive books of travel of which Whymper's "Andes" and Conway's "Climbing the Himalayas" among the newer books, and Darwin's "Voyage of the Beagle," Bates' "Naturalist on the River Amazons" and Wallace's "Malay Archipelago," among the older books may serve as types.

Of special interest to children are King's "Picturesque Geographical Readers" and "Pen and Pencil Sketches," by various authors.

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NOTES.

Popocatepetl and Intaccihuatl.—Dr. Oliver Farrington, of the Field Columbian Museum, has issued a pamphlet on these peaks, wherein he has made use of the observations of former travellers as well as those made by himself during a recent visit to Mexico. The mountains under consideration are the highest points of the Sierra Nevada of Ahualco, lying 35 to 50 miles east of the city of Mexico. Rising out of the plains of Apam in the north, the Sierra gradually increases in height up to its culminating point, Popocatepetl, and then descends sharply to the plateau. It separates the valley of Mexico from that of Puebla; the shortest line of communication between the valleys is over a saddle 12,118 feet above sea-level, which lies between Popocatepetl and Ixtaccihuatl.

Though topographically connected, the two mountains lie, according to Felix and Lenk, on two different lines of fissure. Popocatepetl stands on a line of fissure running east and west, with which are connected the volcanoes Ajusco, Toluca, and Patzcuaro, while Ixtaccihuatl, Telapon, and Tlamacas rise above a line of fissure at right angles to the former. Popocatepetl stands at the junction of the lines, and hence, perhaps, its greater size and activity. The eruptions which built up these elevations took place, according to some authorities, at the close of the Mesozoic period, while by others they are ascribed to Miocene times. At any rate,

man was living at the time the outflow took place, as is proved by bones and fragments of pottery lying underneath the lava. The rock of this outflow is plagioclase basalt. The lava and débris dammed up sections of the country, and lakes were thus formed around which wandered large mammals. The remains of the camel, bison, llama, elephant and horse have been found, and two complete skeletons of glyptodon.

Popocatepetl, the smoking mountain, is by Sonntag's measurement 19,539 feet high, and is, accordingly, the fourth summit of North America, next to Mt. Logan, Mt. St. Elias, and Orizaba. Seen from the west it appears as a symmetrical, rounded snowcapped cone rising about 5,000 feet above the ridge of the Sierra. The average slope of the cone is about thirty degrees. Towards the south its aspect is still more imposing, for it rises directly from the plain to a height of 13,000 feet. The crater edge is highest on the western side, so that the western wall can be clearly seen in fine weather from the valley of Puebla. Successive flows of lava have given Popocatepetl a stratified appearance, and the character of the layers mark, according to Aguilera and Ordoñez, a gradual decrease in the heat and energy of the volcano. The lower deposits are basalts containing a large amount of olivine, while the upper are hypersthenic andesites. The authors just mentioned believe that three periods are indicated by the deposits, those, namely, of lava, breccia and ash eruptions; but probably the change from lavas to breccias, and breccias to ashes, was frequently repeated. In modern times the activity of Popocatepetl has been confined to the emission of steam and sulphur from the crater.

Dr. Farrington made the ascent of the mountain in February, 1896. Looking down into the crater from the ridge of askes which form its lip he saw a pit about 2,000 feet by 1,300 feet and 800 to 1,500 feet in depth. Jets of steam issue hissing from the nearly perpendicular walls, and rocks are continually falling to the bottom. Aguilera and Ordoñez found that the height from the Pico Mayor, the highest point of the ridge, to the little lake at the bottom of the crater was 1,657 feet, while from the malacate (a windlass rigged up to let down the sulphur miners), it is only 673. The rents in the crater walls often vary in number; at the time of Dr. Farrington's visit there were six. Besides steam,

they eject hydrogen sulphide and sulphurous acid, which combine to form sulphuric acid and sulphur.

On the northwest side of the principal cone stands the Pico del Fraile, rising to a height only 1,000 feet less than that of the cone itself. Its general appearance gives the impression at first sight of an old crater, three-quarters of which have vanished, but the Mexican geologists now regard it as an isolated portion of the main crater. Should it date from an earlier period than the main crater, they prefer to connect it with a similar elevation on the southeastern side, and regard the two as fragments of an earlier crater, corresponding to the Monte Somma of Vesuvius.

Ixtaccihuatl lies nearly due north of Popocatepetl, at a distance of about ten miles. In shape it is very different, consisting of a long narrow ridge cut into three peaks, the central being the highest. The snow-covered portion has a striking resemblance to the figure of a woman lying on her back, and hence the name Ixtaccihuatl (white woman).

The Mexicans of old seem to have been totally unacquainted with its flanks, and it was only in 1889 that the first well-authenticated ascent was made by Mr. James de Salis, who was followed five days later by Mr. H. R. Whitehouse. The height of Ixtaccihuatl is still very uncertain; Humboldt and Lenk assign to it less than 16,000 feet, while, according to Heilprin and Sonntag, it is fully 17,000. It is usually spoken of as a volcano, though many writers maintain that the term is incorrectly applied to it. areas of volcanic sand on the mountain may have been blown over from Popocatepetl, while the elongated form, the absence of any well-defined crater and the homogeneous texture of the rocks suggest that it never was a true volcano and may possibly have originated in a fissure eruption. The rock of which it is composed is amphibole-andesite, a rock differing completely in character from those of Popocatepetl. The flora is more abundant and varied than is found on the latter mountain, owing probably to the greater fertility of the soil and more abundant water.

Like Popocatepetl, the upper part of the mountain is covered with snow, which descends, on an average, 2,000 feet below the summit of the mountain. On the former, however, there are no hollows where ice and snow can accumulate, whereas the upper part of Ixtaccihuatl is furrowed by several deep valleys which favor the formation of glaciers. There is certainly one true glacier on the northwestern side, lying between the central and southern peaks. It was named by Heilprin the Porfirio Diaz glacier. This glacier at one time undoubtedly reached much further down the mountain, as is proved by the presence of polished and striated rocks. Packard believes that the mountains must have been covered with glaciers descending to a line 9,000 feet above the sea, or 1,000 feet above the level of the plains, and infers that ice must have filled the pass between Popocatepetl and Ixtaccihuatl, and sent down glaciers to the lakes then covering the plains of Anahuac. Dr. Farrington's observations led him to the conclusion that, while the extent of the glaciers was much greater than at present, there was no vast mer de glace such as Packard describes.—Scot. Geog. Mag., January, 1898.

Coffee Culture in Brazil.—The largest coffee-planting region is found between latitudes 18° and 25° south; but it extends much farther north, and coffee raising is carried on in an immense territory, embracing twenty-five degrees of latitude and twenty-four degrees of longitude.

In the beginning of this century Brazil exported only a very small quantity of coffee, but it is now the principal coffee-producing country of the world.

The coffee plant is not indigenous to Brazil, but it is to-day completely acclimated. One finds, it is true, in the forests of Botucato (State of Sao Paulo) a so-called wild coffee plant (coffee amarello), but they are without doubt plants that have come up from seeds carried by birds or monkeys. The cultivated variety is called in the country "coffee vermelho." The height of the plant varies from two to five metres and the stem measures from 40 to 70 centimetres in circumference.

The processes of cultivation vary according to the locality. Thus in the province of Ceará the coffee plant is always started in greenhouses. The roots are transplanted at the age of two years, preferably from January to April, and are planted at a distance of from 10 to 12 palmos (the palmo is equivalent to about 9 inches). They begin to yield at four or five years. The season for gather-

ing the crop is not always the same; on the other hand, it has quite a long duration, varying somewhat according to the heaviness of the rainy season, which generally begins in May or June and ends in August.

The beans are placed on a paved floor (uncovered), called in the country fachine, and the drying lasts from thirty to thirty-five days. In the State of Ceará the old system of decortication by grinding by millstones (rodieros) turning in a stone trough is still employed. This method leaves much to be desired, for many of the grains are crushed by the weight of the stones. The cleaning and burnishing are done usually by hand.

In the State of Sao Paulo and Minas Geræs, the cultivation of coffee occupies vast areas, and the treatment of the coffee after the crop has been gathered is done in a much more perfect manner than in Ceará, and by the most improved machinery.

The largest fazenda (plantation) in Brazil, and perhaps in the world, is the Dumont plantation (State of Minas Geræs), established by a Frenchman, whose name the plantation still bears. The total extent of the property is 30,000 hectares; 6,150 of which are planted in coffee. The number of plants in 1896 was 4,718,000.

The cultivation is carried on by Italian emigrants, of whom there are 8,000 employed. Each year the extent of this plantation grows, and the production becomes larger and larger.

In 1895 the yield from the Dumont fazenda alone amounted to 4,100,000 kilograms, and that of 1896 rose to 4,500,000 kilograms. This plantation was sold three years ago to a Brazilian company for the sum of 12,000,000 francs.—Bull. Bureau of Am. Repub., September, 1897.

The Floods of the Mississippi River.—The Weather Bureau of the U. S. Department of Agriculture has issued, under the title of "Bulletin E." (also to be published in forthcoming Annual Report of Bureau), an excellent account of the floods of the Mississippi River, prepared under the direction of the Chief of the Bureau by Mr. Park Morrill, forecast official in charge of river and flood service. The report contains a general account of the Mississippi River and its basin, the normal distribution of precipi-

tation and the general features exhibited by the river when in flood, particular account being given of six floods selected for study, viz., those of 1882, '83, '84, '90, '93 and '97. The latter has a chapter of twenty odd pages for its consideration, and is illustrated by plates and maps, giving by far the best general account of a serious flood in this great river that has yet been published. The map accompanying the report is particularly instructive from the way in which it exhibits the control of the area of overflow by the form of the flood plain. [The map is a reduced copy of the important eight-sheet map of the "Alluvial Valley of the Mississippi River" published some years ago by the Mississippi River Commission and available for all schools from its low price of forty cents; it can be had on sending its cost to the Secretary of the Mississippi River Commission, St. Louis, Mo.]

The map of the flooded area of 1897 exhibits a number of important features that may be here briefly reviewed before describing the distribution of the flood itself. In the first place, in the upper flood plain the river follows close to the bluffs of the eastern upland as far as Memphis; or better said, Memphis is built at the southernmost point where the Mississippi touches the eastern The river then swings its meandering course bluffs in Tennessee. westward, touching the western border of the flood plain at Helena and running near the western border to the mouth of the Arkansas It then returns to the eastern side of the flood plain at River. Vicksburg; or again better said, Vicksburg has been built at the northern beginning of the long stretch along which the river follows the eastern bluffs in the lower part of its course. points located near the river in this portion of its course are Natchez and Baton Rouge. It will thus be seen that the flood plain may be roughly cut into three divisions: an upper division, lying west of the river, a middle division lying east of the river, and a southern division lying west of the river, the last being longest of the three and extending to the Gulf. The uppermost part of the valley that was overflowed in 1897 lay to the west of the river in the upper of the three divisions of the plain, but on approaching the point where the river touches the western bluffs at Helena, the flood necessarily spread somewhat over to the eastern side of the plain and then invaded a large area to the east of the

river in the middle division of the plain. In the southern half of the middle division of the plain no serious flood occurred west of the river, but at the southern limit of the middle division the flood again crossed the river and spread over the plain to the west of it on the third or lower division of the valley. The final discharge of the flood was not by the river proper, but along the back swamps between the river and the western bluffs. All this is clearly shown on the map of the flood, and it serves to give emphasis to the slope of the flood plain surface away from the main river.

W. M. D.

Railroad Projects in Nicaragua.—A remarkable feature in the topography of Nicaragua is the interruption of the great ridge of mountains that runs through the American continent. In this, the backbone of the western hemisphere, we find in Nicaragua a deep depression in the shape of two remarkable lakes of 2,600 and 500 square miles, respectively—a most remarkable caving in that reaches as far as the Atlantic coast in the form of the great valley of the San Juan River, a stream of about 150 miles in length and extends to the Pacific as a vast plain, the main level of which does not exceed 100 feet above the level of the sea.

That a country with such features should be regarded as the dividing point between North and South America for many centuries is quite comprehensible. Circumstances, however, prevented the completion of this separation and the connection of the two oceans through the work of man. Although the hope of seeing this problem solved by the construction of the Nicaragua Canal is more active than ever, a glance at the map brings conviction that an outlet for the country to the Atlantic coast, be it by river navigation or railway, would be an easy matter of realization and a paying investment.

With the River San Juan, which nature seems to have destined to form that outlet, time has reversed the intention. Once a stream available to navigation craft of such considerable size as were used by the pirates, who went up as far as Granada to plunder the inhabitants, the river has become more and more difficult of navigation. This change is due to a gradual rise of the eastern coast of Nicaragua and a succession of dry seasons for the

last four years, which have kept the level so low that the navigation carried on even by flatboats has been several times endangered, and is now kept up with great difficulty. Besides this, the harbor of Greytown is closing up more and more and is no longer accessible for vessels of deep draft. The bulk of trade, therefore, takes its course by the way of the Pacific ports-Corinto and San Juan del Sur, fourteen days from New York. good connection between Corinto and the principal inland towns located on the western slope is procured through two lines of Government railway, 58 and 32 miles long, respectively. The gap between these lines is filled by navigation on Lake Managua, carried on by three government steamers of 150 tons capacity each. The trip from Corinto, the western, to Granada, the eastern terminus of the lines, takes twelve hours. - Consular Reports, December, 1897.

Lake Baikal.—Lake Baikal separates the government of Irkutsk and Transbaikalia. This lake is, perhaps, the greatest body of fresh water in the world, for if it has less area than Lakes Superior, Michigan and Huron in North America, and Victoria Nyanza in Africa, it is much deeper than any of these. The following table shows the influence of this lake on temperature of Kultuk, a village at the southwestern extremity of the lake, as compared with Irkutsk, which is 37 miles away on the right bank of the Angara river.

	Lat. N.	Jan.	May.	June.	July.	Aug.	Nov.
Irkutsk	52°16′	-20.°8	8.°9	15.°1	18.°4	15.°8	—10.°6
Kultuk	51°43′	—19.°9	3.°4	10.°8	13.°8	13.°1	— 6.°8

Note the lower temperature near the lake in summer due to the presence of the water. In late autumn and early winter the air over and near the lake is warmer than inland, owing to the liberation of latent heat as the lake freezes. In midwinter, when snow covers the ice to a great depth, the lake cools with the land, and the temperature over land and water is essentially equal.—Annales de Géographic, November 15, 1897.

REVIEWS.

Hölzel's Geographical Charakter-Bilder for School and Home. E. Hölzel. Vienna. \$37.00.

The recent appearance of Nos. 36 and 37 of the Charakter-Bilder, published by E. Hölzel in Vienna, offers an opportunity for emphasizing the need of such illustrations in our American schools. Geography work in schools, if it is to be successful, must be well illustrated, and whatever text-book is used, there is a great need of wall pictures for class use. Lantern slides and photographs are very good and most important if schools have the means of using them. Serviceable geographical pictures of different parts of the world are, however, rarely seen in schools.

The Charakter-Bilder are well-selected, serviceable, artistic, true, cheap and particularly planned for class use. They should be very extensively used in all English-speaking countries. Though the titles are in German, that is no drawback, for most of the illustrations can be identified at once, and are so clear and self-explanatory that no description is necessary, however helpful it may be.

"The pictures are printed in different oil colors, the size of each being 32 x 24 inches; the whole collection now embraces thirty-seven pictures (the price of each being \$1.00); the greater part (twenty-thrce) indeed represent European features, but more than one-third represent sceneries of other continents and six give American views. Five pictures represent different types of vegetation forms, the tropical virgin forest, as well as the Hungarian steppes; nine the forms of the highest mountain ranges in Europe, North America and Asia, with their glaciers; four show the different actions of water; seven pictures illustrate the formation of valleys and the whole cycle of land destruction; four show volcanoes in different parts of the world; eight represent types of coastal formation."

The following selection is made of the best for American use, for the help of those who may wish to purchase only single sheets of the atlas: The Cañon and Falls of the Shoshone; The Desert; Plateau of Mexico and Orizaba; Naples and Vesuvius; Tropical Forest of Amazon; Mangroves in Venezuela: The highest point in the Riesengeberge; Hammerfest; Table Mountain and Cape

Town; Pleisker Head, Giant's Causeway; Grand Cañon of Colorado; Crater of Kilauea (Hawaii); View in Himalayas; Lofoten Islands; Mountains and Lakes of Tartary; Steppes and Kilima-Ndjaro; The Rhine at St. Goar.

We commend the series in its entirety and each picture independently for constant school use. We have found certain ones most convenient and valuable for all grades of work and know that they will stand constant study. Each renewed examination brings to light certain valuable points not hitherto seen. The pictures not only please the eye, but the mind, and should be used extensively by all who desire the best.

R. E. D.

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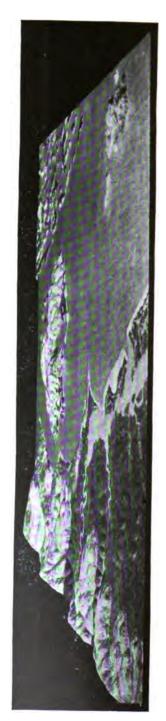


PLATE I. Frontispiece. Bird's Eye View of Model of Sea Coast Characteristics.

THE

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GEOGRAPHY OF WASHINGTON, D. C.

The city of Washington occupies a broad triangular area of terraces at the confluence of the Anacostia and Potomac rivers, near the western margin of the Atlantic coastal plain. Potomac river flows out of the Appalachian province in the great gaps below Harpers Ferry, traverses the Piedmont plateau in a gradually deepening, relatively narrow trough and emerges in a wide tidal estuary as the coastal plain is entered near Washington. Washington is one of the great series of cities situated along the zone of demarcation between the coastal plain and the Piedmont plateau. Trenton, Philadelphia, Chester, Wilmington, Havre de Grace, Baltimore, Washington, Fredericksburg, Richmond and Petersburg constitute a portion of this series and their locations have been determined by a common cause. They are situated on great rivers of the middle Atlantic slope, which traverse the hard rocks of the Piedmont plateau in narrow gorges of considerable declivity. As these rivers reach the soft overlapping sediments of the coastal plain, under which the hard rocks sink, their valleys rapidly widen, falls cease and the heads of tidal estuaries are soon entered. The wide valleys, usually extensively terraced, afford excellent sites for settlements, the heads of tidal

navigation gives occasion for landings, for warehouses and stores and the main stream or its branches falling over the last hard ledges of the rocks afford convenient water power. So it has come that on every river we have had a city built at this border zone. As the rocky shore against which the coastal plain sands and clays were deposited had a nearly southwest and northeast trend and a uniform attitude which has not greatly altered with subsequent tiltings, these cities lie along a fairly straight line.

Two other factors have been prominent in establishing the present relations. One was a general uplift of the great wedge of coastal plain sediments at a moderately recent geologic date, so that the rivers of the Piedmont plateau cut channels across the coastal plain to considerably beyond the present seacoast line. The other factor was gradual depression which followed and is now in progress, in which sea water has flooded the channels far inland to the steeper slopes on which the crystalline rocks rise to the present line of cities. Thus we have the tide water with navigable channels, which was probably a most important factor in locating the cities.

These features are all impressively exhibited about Washington. The greater part of the city itself occupies a fine series of terraces which begin as soon as the Potomac valley emerges into the soft sands and clays of the coastal plain province and which on the north side of the river have added width, due to coalescence with the terraces of the Anacostia river, a branch which rises in the hills north of the main river.

The tidal estuary with reasonably deep channel extends all along Washington and the western portion of the city is at the head of navigation near where the crystalline rocks rise. Farther west the Potomac river is soon confined in a narrow gorge. The western portion of the city which was built on the rapidly narrowing terraces was formerly Georgetown and here there is extensive water power which in times past was employed in flour and other mills of considerable size.

On entering Washington the visitor will at once be impressed with the great width and smoothness of the terraces. They begin near tide water level and, presenting broad expanses of level surface, rise in low scarps and gentle slopes, usually affording good drainage, to an altitude of from 80 to 100 feet where they extend far back to the slope rising to the higher lands north of the main portion of the city. The Capitol building is situated on the edge of a west-facing projection of the higher terrace which was given unusual prominence by the erosion of Tiber creek that formerly flowed at its foot.

Looking more widely about the Washington region one will soon recognize the fact that the valley has developed from a succession of plateaus or originally a single plateau which was the very smooth surface of the coastal plain after it had received its final wide-spread mantle of Lafayette gravel in the division of geological time, known as Pliocene (see figure). The remnants of this plateau constitute the highest hill tops about Washington, having an elevation of about 300 feet above tide water with a gentle rise to the westward. Standing on the high land at the Soldiers Home or the ridge beyond Georgetown and looking to the south, the east and the north, one will notice that all these high summits fall into line. Wide depressions are cut below this plateau level, but there is an even sky line in every direction which brings out its former continuity with great distinctness. The slopes east of Anacostia river are surmounted by a portion of this plain which extends as a wide tabular surface far to the eastward to the valley of the Patuxent river.



Fig. 1.—G, old rocks; SS, coastal plain; AA', upper terrace; BB', second terrace; CC', third terrace; D, capitol; M, monument; R, river.

At the close of Pliocene time the region was uplifted about 100 feet and the Potomac river began to cut a wide valley in the soft coastal plain deposits. Its width was about ten miles at Washington, the present location of the city being near its center. At the termination of the uplift this wide trough was floored with a thin mantle of the earlier Pleistocene gravels and loams. Next followed another uplift, at first of about 100 feet, but aggregating 200 feet before it ceased, during which the Potomac river cut another trough within the earlier one, down to the present sea-

level. The remains of the earlier terrace are now conspicuous on all sides of the city at an altitude of about 200 feet above tide water. A wide area of this terrace is at the top of the slopes north of Florida Avenue where it constitutes a plain of considerable extent over which the newer portion of the city is now being extended as "Washington Heights," "Columbia Heights," "Mount Pleasant" and "Holmead." Across the Potomac river the same terrace rises steeply from the low river flats to the heights at Arlington and Fort Myer, where its level floor extends back for several miles to the slopes of the earlier (Pliocene) high plateau. To the eastward there are fragments of the terrace constituting an area of considerable extent in the vicinity of Saint Elizabeth's Insane Asylum. This terrace level is always sharply separated from the lower terraces on which the older portion of the city is situated, by steep slopes such as those extending along the north side of Florida Avenue. These slopes were originally the boundary of the city and for many years proved a barrier to street extension and the expansion of its settled area. Now, however, many streets have been graded up the slope and the admirable high terrace above promises to be well settled.

The lower or later terraces extending from tide water to a height of 100 feet have great width at Washington, and they extend for many miles up the Anacostia river and down both sides of the Potomac river to its mouth. The city of Alexandria is built upon one of the lower levels on the west side of the river, 7 miles below Washington.

Ascending the Potomac river above Georgetown we find that the lower or later terrace continues up the gorge through the crystalline rocks of the Piedmont plateau. Owing, however, to the hardness of the rocks the entire river trough in this region is narrow, and the remains of this terrace are an irregular bench of slight width extending along the north side of the river at about 100 feet above the water. This bench has afforded a smooth path for the conduit of the water system of Washington and for the electric railway which extends to Cabin John Bridge. It borders the river to the great falls of the Potomac 17 miles above the city, where it merges into the bottom of the river valley at the crest of the falls. The Great Falls are due to the descent of the river

over the edge of this terrace into an inner gorge which slopes with moderate declivity to tide water at Georgetown. This inner gorge is thus indicated to have been cut by the Potomac river since the formation of the lower (later) terraces at Washington, and it gives us a measure of the amount of erosion which has taken place since the construction of these terraces.

Following the formation of the lower terraces there was further uplift of the region by which the Potomac and Anacostia rivers cut channels to a depth of about 40 feet below the present tide level. This uplift was soon followed by depression which is now in progress, a depression which resulted in the flooding of the river channels by tide water which now extends all along the water side of Washington and up the valley of the Anacostia river for several miles.

Streams flowing out of the hills into these drowned valleys, as they are called, are depositing much of their sediment and so giving rise to extensive tidal flats. When Washington was first settled there were wide areas of these flats along the river front; but for several years past they have been in process of reclamation. Their margins are diked and their surfaces raised by filling in with material excavated from adjacent river channels. Along the southwest river front of the city these reclaimed flats are now well above the level of high tide and it is proposed finally to similarly treat the other flats to the southeast along the Anacostia river.

The history of topographic development in the Washington region is very clearly exhibited in its terraces, and a person making a few trips about the outskirts of the city will have no difficulty in recognizing these broader features of its geography as described above. Accurate topographic maps of the city and surrounding country are issued by the U. S. Geological Survey, which show the details of its configuration and give all other necessary geographic information.

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THE INDIANS OF SOUTHEASTERN ALASKA IN RELATION TO THEIR ENVIRONMENT.

To the student of anthropological geography, the statistics of the area and coast line of Alaska are eloquent. Given these figures, with a hint of the topography, he is able to piece together in their salient features any possible inhabitants of this country, evincing therein something akin to the constructive skill of the palæontologist.

Alaska with its islands has a longer coast line than Africa, whose area is twenty times as great. All of the United States possessions, including islands, show a coast line of 33,907 statute miles, and of these 26,364 miles fall to the share of Alaska. The most prominent fact about the country, therefore, is its contact with the sea. And what is true of the whole, is true in an intensified degree of the "panhandle" of southeastern Alaska. This region, extending from the southern point at 54° 40′ N. Lat., northward to the foot of Mt. St. Elias, embraces the 1,100 islands of the Alexander Archipelago and the "ten marine league" strip of the mainland, which is so cut up by fiords that it hangs like a veritable fringe from the base of the coast mountains. The archipelago, embracing an area estimated at 31,205 square miles, has a shore line of nearly 8,000 statute miles, which is twice as long as the whole Atlantic and Gulf coast, including islands.

The Alexander Archipelago finds its origin in a partially submerged mountain chain, which appears on the mainland in the State of Washington as the Olympics, comes to the surface again in the 300 mile stretch of Vancouver Island, again sinks for over a hundred miles, soundings however tracing clearly a submarine ridge, emerges next as Queen Charlotte Islands and finally as the Alexander Archipelago. The great longitudinal valleys between the parallel ranges of this chain are now occupied by the larger water passages which separate the islands from the mainland and from each other, while narrower, more tortuous straits define the spurs and foots of the original system and still others point to the action of glaciers in grinding out natural depressions into connecting links from inland sea to outer sea. This section of Alaska, therefore, presents a perfect maze of bays, inlets, fiords, straits and sounds, of rocky islands, bold headlands and long narrow peninsulas. The largest of the water passages, Clarence Strait, has an average width of from fifteen to twenty miles, while Wrangel Strait is at places not a hundred yards wide. But however narrow, most of the channels of the region are navigable for sea-going vessels, though at times navigation is rendered difficult and dangerous by the furious rate of the tide as it pours in and out of the funnel-shaped passages. And the storms which sweep down from the mountains or rush in from the ocean, concentrating their fury in the narrow avenues open to them between the mountainous islands, set these placid straits seething and boiling.

The Skaergaard, or island belt of the coast of southeastern Alaska, is far more extensive than anything which Norway, Finland or southern Chile can show. More than this, several of the larger islands, Prince of Wales, Kupreanoff and others, have their own subsidiary island barriers between them and the open ocean, which afford a second system of inside passages for steamer or canoe navigation. But to counterbalance this advantage of sheltered sailing, the country suffers much more from a paucity of good harbors than a glance at the map would lead one to suppose. Throughout the region, the mountains rise precipitately from the sea, and a canoe trying to put to shore in a storm is in imminent danger of being dashed to pieces on the rocks. Beaches are rare. Fort Wrangel boasts one of the best in the southern part of the district, but it is only three-quarters of a mile long. As a rule, the only level ground is found at the inner ends of the inlets, where long ago receding glaciers deposited their lateral moraines on the edges of their Here level tracts of two or three miles in extent are often cañons. found.

The climate of all this Alaskan coast region is far milder than its latitude would lead one to expect. Sitka at 57°3′ N. Lat. shows a mean winter and summer temperature of 34° and 54° respectively. Two natural factors serve to mollify the climate. The most important is the Japan current which sweeps along these shores, raising the temperature of the air by its warm waters. The coast of the mainland, moreover, presents to the ocean an al-

most unbroken barrier of high mountains which prevents the warm winds from the Pacific from dissipating their heat over the vast interior of the continent, and at the same time wards off the Arctic gales from this sheltered coast. It also confines, in a great measure, to the Pacific Slope, the precipitation, which, in consequence of the abundant moisture blowing landward from the warm current, is peculiarly heavy. Sitka has an annual rainfall of 81 inches, and Fort Tongass, at the southern extremity of the American possession, 118 inches, and a wet season in Alaska has been known to last 340 days.

This heavy precipitation, combined with the protracted daylight of the northern summers, accounts for the luxuriant vegetation of The mountains are covered up to the timber line with densest forests, and for a thousand feet above sea level these forests are made impenetrable by a dense undergrowth of bushes The ground is covered with a carpet of moss or sphagnum, into which the mountain climber sinks knee-deep at every step. Wherever a seed can lodge in a crevice of a cliff's face or a fiord wall, a tree begins to grow with marvelous rapidity; many shoot up into the air a hundred feet or more, feeding chiefly from the atmosphere, developing no tap-root, but only claw-like tentacles, which attach it to its rocky base. Finally it becomes too heavy for such insecure hold, and the first heavy wind topples The Alaskan mountain-side forests are striated with the white skeletons of such fallen trees, which look as if some giant hand had dropped a bundle of mammoth jack-straws on the slopes. Their presence serves to make the forests still more impenetrable. Consequently, all travel in this country is by water. Bruce, who took the census in the southern half of this region from Frederick Sound to Dixon entrance, says, "In the whole extent of the territory visited by me there is not a mile of road, and I know of but four trails or portages in this whole district."

In spite of the luxuriant vegetation, the country cannot be said to offer favorable conditions for agriculture. The level lands form only a minute part of the total area, and the soil, where any does exist, is very shallow, composed of decayed vegetable matter. The climate is not suited to cereals, which take long to ripen, though barley has been raised. The missions, however, have succeeded in

making their kitchen gardens yield a variety of the hardier vege-Still, the conditions were not such as to invite the native to a farming life. But now, since they have come into contact with the whites, each family has its little potato patch in some sheltered nook, where with childlike faith in the power of nature, they sow the potatoes like grain one season, and then return the next to reap their meager harvest. C. E. S. Wood, in an article in The Century for July, 1882, tells of meeting a canoe full of Hoonah Indians from Chichagoff Island, rowing ninety miles to dig their spring potatoes on some sunny slope. He adds that the tubers were about the size of marbles. But the Indians of Alaska have been supplied by nature with a great abundance of small fruits-strawberries, huckleberries, salmon berries, raspberries, red and black currants, and a species of cranberry-all of which grow in the dense thickets or mossy swamps. Most of this harvest is dried and stored up for winter use, while certain kinds are preserved in oil.

Everything points the Alaskan native to a sea-faring life. While the land cannot offer him sufficient subsistence to keep soul and body together, and affords only now and then a shelving beach for his squalid villages, the sea on the other hand gives bountifully of its kind. The Indian has come to utilize almost every product of the island channels and streams. His bill of fare consists of clams, mussels, herring and its roe, cod, salmon, halibut, porpoise, seal, duck, geese and the eggs of aquatic birds. knows where the best fishing grounds are, and the network of straits are his safe and easy highway for reaching them. permanent winter villages are generally situated on good halibut banks, for those fish are to be caught all the year round; but as he relies also on the salmon catch to fill his winter larder, every family owns its own salmon stream, which descends in the line of succession as the most valued heritage. It is a preserve, and woe be to poachers! The Tsimpseans, who inhabit the coast and islands of the extreme southern part of the district, had, in the days of their prime, twelve villages on the Skeena River for salmon fishing, twelve on the Nass for oulachan fishing, and twelve permanent winter villages on the coast near the halibut grounds. The oulachan, or candle-fish, is one of the delicacies of the coast.

It is about six inches long, an inch in diameter, nearly round, and contains so much oil that it will burn like a candle, or fry in its The natives extract the oil, which they use as a sauce own fat. to their other food in winter. The run of the salmon begins in the early spring and lasts till September, and during this season the fresh-water streams fairly teem with the fish in search of spawning-grounds. At Waha Bay 10,000 salmon have been caught at a single cast of the seine. On their own streams the Indians spear the fish or catch them in nets, as a rule, but a few of the more progressive are beginning to use seines. Herring are found during the summer on various parts of the coast. run in such large shoals that they are dipped out by the Indians with net or baskets, or simply raked in by a bit of lath set with The natives carry their surplus herring or salmon to the oil factories or canneries which have been established along the coast. In fact, they are often employed by the canneries to aid in the fishing; and as they are in general very industrious and are paid according to their catch, they can often earn from five to six dollars a day. The native women and children work in the canneries themselves, cleaning, cutting up and packing the fish.

Halibut fishing is done with a hook and line, and even here the sea aids the native by furnishing him with the most important part of his tackle, the line. It is made from the giant kelp, which sometimes attain a length of three hundred feet in channels where the sweep of the tide is strong. It is soaked and bleached in fresh water, then stretched, dried and worked until it becomes a strong, pliable cord. The hook, which is a foot long, is cut from the heart of spruce or cedar roots. The last feature of the equipment is a heavy wooden club, with which the great fish is dispatched when hauled to the surface. With these crude implements, the Indian can catch more halibut in a given time than the white man with all modern appliances.

Having found his halibut grounds, the Indian proceeds to locate his village if a stretch of beach affords a site. If the situation is sheltered by a point of land from the prevailing storms, so much the better, though villages are sometimes found on very exposed sites. The houses are generally ranged in a single line, and so close to the shore that when the tide is highest the water comes

almost to the doors. Near by is the burying ground of the tribe. Natural conditions have determined the custom of the natives in disposing of their dead. Where soil might be found deep enough to bury them it is always wet; so it is the custom to erect for the dead small wooden houses set upon poles, with sometimes a picket fence around them.

All the activity of the village life is centered on its beach. Here is to be seen the Indian's greatest pride and most valuable possession, his canoe. It is his war chariot and draught-wagon and coach of state. He spends his most skillful efforts on its construction and tireless care in its preservation. The process of making a canoe is neither a rapid nor an easy one. A tree has to be selected with much care, for the taste of the Alaskan native in timbers is fastidious. From long experience he has become an excellent judge of the various kinds. He prefers spruce and the yellow cedar, which grows on the Queen Charlotte Islands (British possessions), and in places along the southern Alaska boundary. The woods of both these trees split readily and straight and are easy to work, an important consideration in view of the primitive tools of the natives. The trees are generally selected near some watercourse and felled so that they will crash down the steep slope towards the water's edge. There they are launched and towed off to the summer camp, where the rough hewing and shaping is done by means of wedges and sledges. The finishing work is reserved for the long, dark winter. The interior of the canoe is patiently cut out with an adze and when roughly worked out it is widened in beam by steaming. It is partly filled with water, in which hot stones are placed and, as the wood becomes more pliable, stretchers or thwarts of gradually increasing size are forced in until the canoe takes the desired shape. To lessen the friction of the water the exterior is smoothed down with sandpaper, sandstone or shark's skin.

The very best canoes on the whole coast are made by the Haidas of Queen Charlotte Islands. This archipelago, being more remote from the mainland and more exposed to the swell of the open ocean, has produced a race which excels in canoe navigation and all that pertains thereto. The Haida canoe has a curved bottom, a high rounded stern and a long projecting prow; it is

light and graceful and always finds a ready market. Massett Inlet on the northern shore of the northermost island of the group, has been called the Clyde of this coast; canoe making is always in progress there. The family or traveling canoes, which are twenty to thirty feet long and four to six feet wide, sell for a hundred dollars or more. The hunting or otter canoe is a cranky little craft from six to ten feet long, in which, however, Haida experts venture far out to sea.

The Indian canoe is usually propelled by a paddle, but sometimes they are provided with sails. These were formerly made of mats woven from cedar bark, but now canvas is employed. When not in use, the canoe requires constant care. It must always be kept wet, and consequently, when drawn up on the beach is protected from the sun's heat by blankets and cedar boughs.

It is a natural development that these Indians are bold and skillful navigators. They sweep the "inland passage" from Glacier Bay to Puget Sound, and venture out to Forrester Island, which lies twenty miles out in the "open," to gather the eggs of wild fowls. As the waters of the deep, narrow inside channels are kept constantly at a low temperature by the number of snow-fed torrents and tide-water glaciers that debouch into them, the native have the greatest fear of being capsized, knowing they would instantly be benumbed by the intensely cold waters. Hence they have become excellent judges of the weather, and whites who travel in the native craft in this country will never urge an Indian to undertake a water journey if he considers the weather unfavorable. The Indian is also authority upon the geography and topography of his country.

His mode of life has left its impress upon the coast Indian's physique. The Tlingits, who together with a few Haidas and Tsimpseans originally from British territory, make up the native population of southern Alaska, are thus described by Eliza Ruhamah Scidmore, in her Guidebook to Alaska. "In common with all Northwest Coast people, the Tlingits have inherited a magnificent development of the shoulders, chest and arms from generations of canoe-paddling ancestors; but the rest of the body is stunted and deformed, and all are bow-legged and pigeon-toed, shuffling, shambling, and moving as awkwardly as aquatic birds

on land." But with the introduction of civilization, many of the Tlingits have learned to make a living as laborers in the salmon canneries and salterers, in the gold mines, and at hop-picking in the state of Washington, and such have improved in form, more especially since they are pressed into service in the hop-fields and canneries even as children. Some of the tribes, however, like the Chilkats, Chilkoots and Takus, who live at the inner ends of the long fiords indenting the coast of the mainland, show a different physical development owing to a different mode of life, consequent upon modified geographical conditions. They are taller, better formed than the other Tlingits, and what is an exceptional thing among this tribe, they are great hunters. Their especial game is the bear and the mountain goat which are found high up on the coast ranges. They have been the middle men in the fur trade with the Tinneh or mountain tribes and the Hudson Bay Co., who were never permitted to come into contact with one another. The Tinnehs brought their skins to the divides, whence they were carried down by the coast men to the English traders. mountain climbing has resulted in a fine physical development. It is these Indians who have done such excellent service as packers for gold seekers on the Yukon trail.

The tribes of the islands and of the exposed parts of the coast are decidedly averse to walking. Debarred from the interior even of their own archipelago by palisade-like walls or densely forested mountains, they have gradually ceased to rely on nature's means of locomotion, which have consequently become unfit for strenuous use. The Indians are occasionally employed as packers by Englishmen who come to different points along the coast for bearhunting; but they prove most unsatisfactory in this capacity, for they soon come to the end of their endurance, and then neither threats nor bribes can induce them to go on. They are paid well for such work, too, and their natural acquisitiveness is great. For this same reason, chiefly, they are poor hunters, though game is abundant. Venison and bear's meat are but occasional articles of diet, and these are procured only under exceptional circumstances.

When there is an unusual amount of snow on the mountains, the deer are forced to come down to the coast for food and then are killed. The bear are tempted down to the margin of the streams in early spring by the skunk-cabbage on which they feed greedily, or a little later by the salmon which they paw ashore and eat. On these occasions they are readily killed, but the natives rarely track them into the interior. This avoidance of the chase and dread of the forests characterizes also the Indians along the whole coast of British Columbia.

The fringe of peninsulas and the islands of the Alaska coast have brought forth a race endowed with the strong commercial instinct which such an environment always develops. In spite of the fact that the climatic and geographic conditions are about the same all along the coast, the isolation of an island or peninsula habitat of necessity produces some specialization of products. Hence inter-tribal trade springs up, and each locality brings to it that ware or raw material in which it excels. The Haidas of Queen Charlotte Islands and Prince of Wales Island have the best vantage ground in killing the seal, which come into Dixon entrance on their way to Bering Sea. These tribes can always find a ready sale for their fine canoes. The Chilkats of the mainland, who have readiest access to the mountain goat, weave from its wool the famous Chilkat blankets, which are in demand along the whole coast. The interior tribes specialize in the fur trade; and the fine skins of the back ranges find their way over the passes, down the rivers to the sea. On the Nass river in British Columbia, the coming of the oulachan in March and April is the occasion of a great yearly fair. The Haidas bring their canoes and boat-loads of potatoes to exchange for oulachan oil; the Tinnehs come down from the mountains with skins and horns, which are manufactured into spoons; the Tlingits bring their mats and baskets woven out of cedar bark or grasses, or their platters and dishes carved out of wood and inlaid with mother-of-pearl; and the Tsimpseans, native to the region, are busied to the man in gathering the valuable oulachan from the waters, in order to procure some of the desired commodities offered for sale. It is said that formerly as many as 14,000 Indians used to congregate at these Nass river fairs.

The characteristic of the Alaskan tribes which most impresses the traveller is their restlessness. They are constantly on the move; they seem mobile as the waters on which they dwell. The summer visitor goes to see their permanent villages and finds them

almost deserted; even the women and children are gone. He is told that the people are off at the various fishing grounds. stops at some of the canneries on the coast of British Columbia, he finds among the employees natives from Wrangell Island or still farther north. When the vessel on which he is making his tour steams into Glacier Bay almost at the foot of Mt. Fairweather, he finds encamped on a lateral moraine of the Muir Glacier, a group of Indians, who have come heaven knows whence, just to await the arrival of the steamer in the hope of trading some of their baskets and curios. And within an hour afterwards, their camp is broken up, and their gay canoes may be seen as so many bright spots on the gray and white landscape before they disappear around some These same Indians from the Glacier Bay region do not hesitate to make the thousand mile journey to the state of Washington for the hop-picking. The month of September, when the hop season begins, sees all the inland passages alive with canoes filled with native families on their way to the hop fields. that these are so far distant seems only to add an element of pleasurable excitement to the experience to the Alaskan Indian. happiest when moving; he is more at home on the water than on land, in his canoe than in his cabin or hut; and he finds his food as readily in Puget Sound as in Glacier Bay. He draws his strength, not from Mother Earth, but from Mother Sea.

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A MODEL OF SEA COAST CHARACTERISTICS.

The Model of Sea Coast Characteristics (see Plate I.), of which a detailed description follows, was constructed with a view to presenting in a concise and helpful way, the general characteristics of different types of seacoasts. The model is planned for use in normal schools, in the higher grades of grammar schools, and in high schools. No single region has been reproduced, for no single locality of the limited area represented in the model, shows so many characteristic forms. All the features represented are based on existing examples, and thus this model, though in a way diagrammatic, is in no way impossible.

The present geographic features of any land are results of its past history, and cannot be adequately understood unless that past history be known. Hence the model is planned to show the past as well as the present, and the description which follows treats the different stages of development through which the area has passed, beginning with the oldest.

First Stage, Peneplain.—The earliest form of land which can be made out, was a flat region worn nearly to the level of the sea, with occasional low hills, relieving the monotony of what would otherwise have been a plain. Through this lowland of denudation, or peneplain, which is represented by a contour * sketch map (see Fig. 1), a few sluggish streams meandered in broad valleys. The

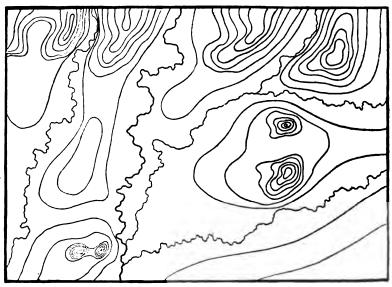


Fig. 1.—Peneplains with Monadnocks.

trace of this old peneplain is to be found in the average elevation of the "Old Land" of granite rock, which forms the backbone of the region (see Plate I. and Fig. 5). Parts of these igneous rocks are seen to rise above the general level of the smooth upland, as isolated dominating peaks, the remnants of hills that previously rose above the peneplain because of their greater resistance to

^{*} For interpretation of contours, see page 230.

erosion. From their similarity to Mt. Monadnock in southwestern New Hampshire, geographers have come to call such hills, monadnocks. Such an old lowland is to be interpreted in the even hill tops of southern New England. The subsequent history of the lowland is revealed in the succeeding stages.

Second Stage. Elevation—Permitting Deep Dissection.—After the region had remained a long period at the level described as the first stage, the country underwent such elevation that the streams became empowered with new cutting energy. As a consequence of such an uplift, the rejuvenated streams began to deepen their channels, to straighten their courses, and to develop lateral tributaries. The increased number of streams, aided by the greater precipitation due to elevation, eventually brought the region into a thoroughly dissected condition that may well be called maturity. Lowlands were produced on the area of less resistant schistose rocks, while the harder granite rocks became steep-sided mountains.

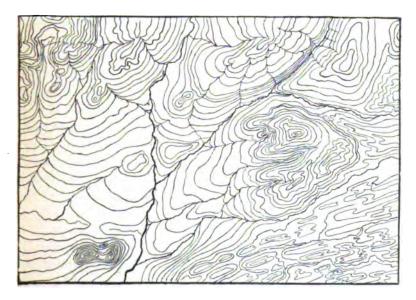


Fig. 2.—Development of Mature Drainage Systems.

At this stage (See Fig. 2) a great amount of erosion has taken place, the land has become sculptured into its severest forms, and yet the work of degradation is going on with the greatest rapidity.

In such a region intercommunication would be much hampered by the depth and steepness of the valleys, and the high, deeply ravined mountains would be practically inaccessible; in every way a region poorly adapted for population. Part of the Berkshire Hills of Massachusetts are good examples of a land in this stage of development.

Third Stage.—Showing effect of subsidence—(Fig. 3). sequent to the period of elevation of the second stage, came a period of depression, so that the sea entered the region and submerged about half the area contained in the model. Adapting itself to the outline of the land at the new level, the water produced a very irregular coast line. All the former lowlands now lie below sea level, with the old highlands alone showing above. The lower courses of the old rivers are immersed, forming deep estuaries—west side—and the former tributary streams now empty as separate rivers into an inlet, or flow directly into the sea itself. Such lateral streams, well called "betrunked," may be found in Christiania fjord (Norway), Penobscot Bay, Narragansett Bay. Chesapeake Bay, and other large estuaries produced by submergence or "drowning." As the former river valleys have now become inlets of the sea, the larger bay is found where the widest river previously flowed. The isolated heights are now islands in the sea, having first been, as it were, islands of the land. more noticeable of these are: first, the large island in the northern end of the area, which, being largely of granite and lying close to the mainland, resembles Mount Desert on the coast of Maine:* second, the sea girt island in the southeastern part. This granite rock, isolated at a considerable distance from the mainland, is comparable to the high granite island some eleven miles off the middle coast of Maine, known as Monhegan. † The island, formerly an outlying mountain top, surrounded by a lowland of denudation (Fig. 1) reaching to the highlands in the north and west, has now lost all communication with the mainland, save that by water. The small low islands, or "stacks," off the shores of the peninsulas in the west, have their counterparts among the numerous small is-

^{*} U. S. C. S. 292. References are to be numbered charts of the United States Coast and Geodetic Survey, unless otherwise noted.

[†] Ibid., 313.

lands along the coast of Maine, particularly in the region about Boothbay and Sheepscot River. On the northeastern side of the area, the sea has entered among the bedded schistose rocks, producing narrow channels following the longitudinal trend of the deepest valleys and occasionally cutting across the strike of the rocks in some low divide, to form a narrow connecting passage, termed a "gut," along the Maine coast-"Townsend Gut,"* "Herring Gut"† The deep waterways among these drowned islands are excellent shelter for shipping, affording not only refuge in times of storm, but safe and comfortable ship channels for all vessels. The Fox Island Thoroughfare, Deer Isle Thoroughfare, \$ Moose-a-bec Reach, as examples of such channels, afford ideal cruising grounds for yachts. The partially submerged region remained at this altitude long enough for the streams which reached far back into the interior, to bring down and deposit such loads of waste, that the bottom of the estuaries and surrounding sea became covered with a gently sloping coastal shelf. for a second time the region underwent elevation, though not in the same direction, or as widespread in its effects, as that of the previous uplift.

Fourth Stage. Tilting (See Fig. 4). The second elevation was due to the tilting of the region along an axis running north-The area on one side of this axis rose, while west and southeast. that on the other, the eastern, sank; the result being that a part of the unconsolidated materials of the coastal shelf appeared above the water as a smooth gently inclining coastal plain, with its inland border, the old granite shore line. As the greatest elevation took place in the southwest, here the broadest part of the coastal plain was brought to light, its width gradually lessening towards the north; in a similar manner, the region on the down side of the axis suffered greatest depression on the extreme northeast, the greatest distance from the fulcrum of movement. A comparison of Figs. 3 and 4 will show the effect of this oscillation. coastal plain now occupies a large part of the old under-water area

^{*} Ibid., 315.

[†] Ibid., 313.

[‡] Ibid., 313a.

[§] Ibid., 309.

^{||} Ibid., 304a.

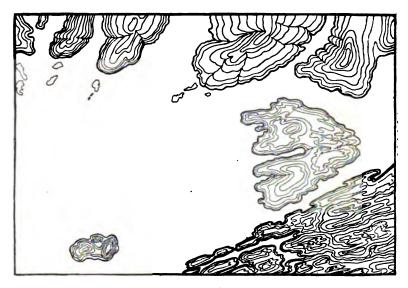


Fig. 3.—Submergence—Old Valleys Drowned, Coastal Shelf Depositing.



Fig. 4.—Tilting—Elevated Coastal Plain, Depressed Stratified Rocks.

of the submergence period, shown in Fig. 3. It has wrapped itself about the old headlands, whose ancient sea cliffs, cut in the granite rock by the waves during the submerged period, are thus

defended.* On the east side lies an archipelago, with a linear arrangement of its islands, which decrease in number and size towards the southeast corner. These are the mica schists, whose longitudinal valleys, worn out along the strike of softer layers by subsequent streams, have now become filled with sea water.

Across the new plain, the old rivers extended their channels, each quickly developing a valley bottom consistent with the amplitude of the swing of its current. At the same time the sea, by combined action of wave and tide, was cutting back a portion of the most exposed shore. Narrow disconnected portions of the uplifted sea bottom are now to be seen clinging in the indentations along the uplift side of the large island (Fig. 4). The eastern side, by its slight submergence, has diminished rather than increased its irregularity.

Following the stage represented by Fig. 4; gullies, started by some initial peculiarity, commenced to gnaw back from the main rivers into the inter-stream spaces, deepening as the master stream cut down its channel. From these growing branches others were in turn given off; and new and independent rivers, started from initial gatherings of head water drainage, began to cut into the young coastal plain, so that it soon came to have a well developed drainage system, approaching maturity. A coastal plain of similar dissection is to be found in the region about Baltimore, Md., especially well shown on the Leonardtown sheet of the United States Geological Survey.

Fifth Stage. Slight Submergence. The next interruption represented on the model, was a slight submergence of uniform amount over the entire region. Though barely noticeable where the land descended steeply into the sea, this depression caused a pronounced irregularity in the lowland coast, the mouths of the rivers being drowned so that each stream emptied into an estuary. Although no separate map is made showing the region immediately after this drowning, the effect can be made out from the sketch map of the present topography (Fig. 5). The other alterations incident upon this depression consist of some cutting by the sea, subsequent protection of the main land by the building of offshore bars, and later, still more complete defence from the

[&]quot; "Sea Cliffs of Ancient Date," Fig. 5.

waves by a growth of delta and marsh deposits within the quiet waters of the lagoon. (All shown in Fig. 5.) A lagoon growth of similar nature may be seen on the coast of New Jersey, especially well shown between Barnegat and Manasquam Inlets.*

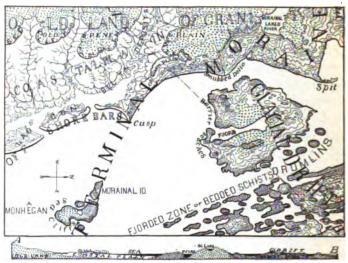


Fig. 5.—Sketch Map of Model No. 4; Depressed Slightly and Glaciated.

Sixth Stage. Glaciation (See Fig. 5).† About the time of depression, the region was visited by a glacier, which, descending from the north, spread out across the modeled area, and became an active agent in altering the surface of the land. A trace of the southern extension of the ice front appears in the "Terminal Moraine," a somewhat irregular ridge composed of clays, sands, gravels, and boulders, with a peculiarly irregular arrangement of numerous disconnected hills, hollows, undrained ponds and marshes. This moraine, appearing upon the modeled region in the northwest corner, wrapped itself about the knob of "old-land" (a monadnock of granite), strewing the northern side with sandsgravels, and other detritus carried by the ice. The south side being in the lee escaped some of the veneering. On following the moraine southward it is seen to have crossed the mouth of one of

^{*} U. S. C. S., 121.

[†] Glacial topography in contours.

the rivers which flowed out from the "old-land" across the coastal plain into the sea, the trail of glacial débris forming a complete barrier across the river valley and converting part of its upper course into a lake; at the same time the river's old lateral tributaries became separated and independent streams (See "Morainal Laked River," Fig. 5). Overflowing at the lowest part of its barrier, the water ran along the outer edge of the moraine, over the granite rocks, following the most available new channel toward the sea. When opportunity offered, the stream spread out in old valleys carved in the granites, and likewise made use of recessions in the morainal front, and time after time uncovered some granite spur, through which it cut a narrow channel. Finally the stream rid itself of the hard rocks altogether, and rapidly cut a deep gorge to the sea, in the soft material of the moraine. This sudden change from the hard rock to the unconsolidated moraine, produced a fall. Waterfalls of similar nature occur all along the New England coast, and, possessing the two important recommendations of sheltered harbor and abundant water power, frequently determine the sites of manufacturing cities. A plain composed of fine materials washed from the terminal moraine, slopes gently southward to sea level (See "Glacial Wash," Fig. 5). Such a plain occurs at Plainfield, New Jersey; on the south side of Nantucket and Long Island.

The moraine passes across the old rocks down upon the coastal plain, and thence into the sea. Near shore, however, a part shows above the shallow water in a morainal island, now tied to the mainland by a sand bar. Two other morainal islands and a patch of glacial till, left on the granite island, mark the old ice front. The hummock and "kettle" topography, the ponded hollows and round "short hills" that characterize these morainal islands, may be found on Block Island, and are especially well shown on Nantucket.

Within the terminal moraine a pretty thoroughly glaciated region is shown. A heavy mantle of drift material, the common feature of the territory inside a moraine, rests on the large island. The preglacial valleys are filled or partly obstructed; the streams have been diverted by dams of glacial drift, producing ponds, many of which have been later changed into marshes. Among the

islands of the fiorded region on the east, the drift has filled many of the old drowned valleys, levelling them with the tops of the ridges. It has also—in cooperation with the subsequent shore building—aided in the connection and grouping of neighboring islands. The drainage being interrupted by varying thicknesses of glacial débris, long narrow lakes or marshes were formed in the old valleys cut from the bedded rocks; where the barriers were thin and irregular, strings of ponds and meadows occur.

The lenticular hills of till, known as drumlins, with their longer axes running in a northeast-southwest direction parallel to the course of the glacier, are seen to rise across the chains of islands on the northeast, and, together with the cloaking of drift, present a linear arrangement of the topography wholly unsympathetic with the northeast-southwest trend of the bedded schists. drumlins to the north and in the lee of the large island, show little effect from wave erosion, but those at the southern and exposed end, have suffered much from the sea, and one hill is more than half gone. The proximity of the drumlins to the moraine, while perhaps not their most usual position, is well substantiated by the region about Madison,* Wisconsin. basin lake in the granite on the east side of the large island (See also section, Fig. 5) is comparable to Eagle Lake, Mount The glacier is supposed to have hollowed out this basin, and likewise to have deepened and straightened the fiord which nearly divides the island. Such fiords with sills at their southern ends, deepest within, are found on the Maine and Norway coasts.†

Seventh Stage. Recent Coast Building. Coast development which has been going on throughout the different stages, though the effects have been largely destroyed by repeated oscillations, is shown in the model to have caused some shore alterations. After the waves had cut back a portion of the coastal plain—which being very low and composed of unconsolidated materials was easily worn—they began to form bars in the shallow sea at a distance from the land. As the barriers grew above water, deposits made by storm waves and wind blown sand contributed to their height. Built at

^{*}U. S. Geological Survey, Whitewater Sheet, Wisconsin. †Somes Sound with Eagle Lake, U. S. C. S., 292, Sheepsoot R., U. S. C. S., 314.

right angles to the prevailing force of the breakers, these off shore bars are smoothed into the direction of the long-shore currents on their exposed side. This smooth outer line is broken only where some larger stream has managed, in coöperation with the tides, to maintain a passage to the sea. At these outlets, frequently an overlapping of bars occurs, and the offset of one bar with its neighbor may be very readily noted, both these features being largely determined by the prevailing long-shore currents, the current flowing from the outer curve toward the inner.

Within the barriers, in the quiet lagoon, the river waters deposit sediment brought from the land; the tides also bring additions to this delta material, aiding in the growth of a fringing marsh clinging to both mainland and bar, with tidal channels maintained between. A net-work of thoroughly irregular tidal streams is characteristic of such a formation. This growth of detritus has added further protection to the coastal plain and the feeble sea cliffs formerly cut at its retreating margin.

A sharp cusp has built on the seaward point of the morainal island now attached to the mainland by a bar; there is a similar cuspate growth, or "foreland," at Sandy Point, on Block Island. The cuspate form is attributed to an outgrowth of deposits in the slack water between two back set eddies.

Following north the curve of the coast line, straightened by the dominating long-shore currents, a small delta is found lying at the mouth of the river flowing from the morainal lake. The tides being able to carry rapidly away nearly all the deposits brought down into the sea—most of the river's sediment being filtered in the lake through which it drains—a much stunted, or "snubbed delta" results. The delta of the river Taglimento, on the Italian coast, has this form. Just north of the delta, lies the river's abandoned estuary, which is being rapidly filled with silt. Two spits have formed across this inlet, the northern overlapping, a witness to the predominance of the tide during its ebb. For example, see spits at Duxbury Harbor,* Mass.

The shore line seems to terminate in a long spit, trailing northward and incurving to a hook, of the type of Sandy Hook, New York Harbor. The materials for the formation of the spit were

^{*} U. S. C. S., 338.

derived from the easily abraded morainal material, together with some small amount of wearings from the exposed bed rock along the western sound.

At the southern end of the large island, some of the drumlins have been much eroded and later joined by bars. The detritus derived from the erosion has been carried along the shore and deposited in the form of trailing spits, which may eventually meet and form a continuous connecting beach. On the east side of the island, the barrier beaches built from drumlin to drumlin have enclosed a space of quiet water making a lagoon, and thus protecting the rocks of the shore and the less exposed drumlin. On the west side of the fiord, a smaller lagoon has become completely silted up, and, aided by contributions of wind-blown sand, has now grown to be a dry marsh. This interaction of sea and drumlin has perhaps its most perfect illustration in Boston Bay, Massachusetts.*

Wherever the open sea has access to resisting rocks, sea cliffs occur. The instance called "Monhegan," with its considerable altitude, hard granite rock and direct exposure to the open sea, has developed the highest and most mature cliffs, the highest occurring, as at the real Monhegan, on the southeast or open Atlantic side, as would naturally be expected. The more exposed schistose rocks have been nipped by the waves, which, cutting at one place and building at some other, have materially straightened and shortened, throughout the entire area, the original extensive coast line.

Sea cliffs of ancient date, carved in the granite rocks of the oldland during the period of submergence, may be made out by a close examination of the contact between the coastal plain and the granites, where the old shore must have been during the formation of the former. These cliffs are indistinct, as they have been nearly obliterated, or "healed," by the rounding of their tops by weathering and by the talus collected at their bases.

The low cliffs cut in the retreating coastal plain—directly after elevation by tilting—though they are of comparatively recent date, and now well protected by a "foreland" delta growth, were formed in such yielding materials that distinctness has been lost, largely through the weathering back of the face.

Thus we see illustrated in the model as a whole, not only the *U. S. C. S., 337, Winthrop Head, Grover's Cliff, et. al.

several types of sea coast found along the Atlantic border, but also the several stages of history through which this area has passed in recent times. Parallel examples of sea-coast characteristics may be found in great number throughout our Atlantic States, but good illustrations are rarely seen in schools. Hence the reason for such a graphic and summary representation as the model described is intended to afford.*

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A SYLLABUS OF GEOGRAPHY.

The primary object in teaching geography is, not to give information, but to train the mind; a fiction learnt rightly may be more valuable educationally than a fact learnt wrongly. We wish to train the mind to observe, reflect, reason, compare, contrast, organize, etc.; and nothing teaches these things better than geography, because it is entirely a human science.

But, for the same reason, it has no interest to most of us apart from man, and therefore must be taught from the human point of view. This is certainly the only point of view that appeals to the average boy. He is interested in what he himself does, eats, wears and hears discussed at home, and practically in nothing else; but he will spend any amount of time and trouble on what does interest him—which includes the Relation of Man to the Earth.

The amount taught is quite immaterial, though boys are insatiably curious; and the area is equally immaterial, so long as it is rightly taught. Women especially worry themselves unnecessarily, both as to amount and as to area. One naturally choses any area that is set for any examination which one's classes take; but limitations of time force one to ignore trifling details, and to concentrate attention on the great phenomena of the science, and the chief necessaries of human life.

These, of course, should be presented so as to appeal to the reason and imagination, not the memory; observation and verification of facts, argument by cause and effect, application of known

^{*} A few copies of this model may be obtained on application to the author.

conditions to new cases—these are the educational elements. And the best results will probably be obtained by giving up the stereotyped plan of dealing with countries piecemeal, and by taking all kindred phenomena together and apart from other phenomena—at least, to begin with.

I think these suggestions will answer most of the general questions that are asked. Questions about details are more difficult. Our geography in the Junior classes (6 to 9 years) consists of (I) gossip about rain, apples, bagpipes, etc., and (II) pictures drawn on the blackboard lying on its back across a couple of desks. These boys will enter the Upper School with correct ideas of relative size and distance, necessaries of life and great phenomena.

The upper classes begin with a revision and amplification of this. For instance, illustrations may be added to show how necessary some squealing instrument with a reservoir of air is to Highlanders, who have to climb and fight and blow at the same time. But the work of the upper classes is a definite area.

There are on the walls of the class-rooms very large physical and political maps of the area, and a huge "Mercator;" and every boy has an atlas of his own in which he looks up every place mentioned. He knows that you are perfectly indifferent whether he remembers it or not, and therefore he remembers it and—will spell it correctly.

The first lesson should collect all the men of the area, High-landers and Lowlanders, farmers and fishermen, Black and White, soldiers and sailors, etc.; and, according to the age of the class, explanations of racial color, occupation, environment, will be added. Then food, clothes, sports, etc., will be dealt with in a similar manner; and any places incidentally mentioned will be looked out and underlined by everyone. If pictures and specimens can be produced, so much the better; and my own experience is that almost any conceivable portable thing that you ask a class for will be forthcoming from parents or friends.

In succession, all the great phenomena of the area will be discussed separately—all the great mountains, the great rivers, the great plains, etc. Each set will be treated comparatively; and, according to the age of the class, explanations will be added—e. g., why the mountains are in a particular place, and run in a particular

direction and have a particular shape. The boys verify everything on their atlases, and thus they absorb the maps insensibly, while their minds are going through a series of most bracing scientific exercises.

By the time that you are ready to begin the area itself the class is really familiar with its climate (with its effect on animal and vegetable life, form of houses, choice of sports, etc.), its mountains (as political boundaries, homes of warlike people, sanatoria in the tropics, source of rivers, minerals, scenery, etc.), its rivers (fast and slow, sources of food and water-power, irrigators and transporters), its natural sites for cities (where there are easy defence in time of war, easy access in time of peace, and natural wealth of any kind), and so on.

Again, details will depend on the age of the class and your own particular bent of mind. One man will illustrate climate by comparing the very "fat" milk of the reindeer with the very "thin" milk of the Arab mare; another by comparing the shriveled yellow skin of the Eastern Asiatic with the "rich" skin and lips and nose of the Western African.

So, too, with standards of judgment. You measure by the latitude of your own town, the height of the nearest mountain, the size of your own county or country; but you have probably mentioned tea and tobacco, coffee and cotton, at some time or other. And if so, your boys know, without thinking about it, that Havana and Canton may represent one tropic, and Rio and Rockhampton may represent the other, that New Orleans is 90° W., and Calcutta 90° E. You will begin the definite area by considering its general surroundings—sea or land, safe or dangerous, hot or cold, the fishing, islands, etc. General surface follows—high or low, position and comparative size of mountains and plains, rivers and lakes. Thus the great phenomena, which have already been studied separately, are now studied in direct relation to one another.

This leads on to climate again (slope, height, wind, rain, etc.), on which vegetation depends; and minerals and fauna complete the general survey.

Then each country should be taken separately, on the same plan, and compared with the other countries in the area; and much more time may be spent on the first than on the rest, for the latter are practically known before you come to them.

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Towns, of course, are new, and therefore interesting as well as profitable, but don't be afraid of omission! Importance has not much to do with size; and, educationally, important towns are those for the existence of which you can give reasons.

I think that a text-book should always be used, but only one that ignores trifles and that gives reasons. The best text that I know of is to give your class an imaginary country to describe, providing them with information about its latitude, surroundings and general surface, and making them deduce its climate, rivers, vegetation, cities, etc. If they can do this with anything approaching accuracy and success your work has not failed.

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GLASGOW ACADEMY, Glasgow, Scotland.

NOTES.

Contours.—Contours are imaginary lines drawn on the surface of a country, all points in each line being of equal elevation above mean sea-level. They are indicated on maps by contour lines which usually represent five (5), ten (10), twenty (20) or more feet vertical interval, according to the scale of the map, large-scale maps usually presenting small contour intervals.

Consider the contours of an island in mid-ocean, where the rise and fall of the tide is small.

The shore line at half tide would represent the zero contour, and on the map would be indicated by the water line. Imagine the island uniformly submerged ten feet, and the new shore line (at half tide) coincides with what, before submergence, was the tenfoot contour. Again imagine a submergence of ten feet, and the new shore line resulting occupies the exact position of the former twenty-foot contour. In other words, by the relative rise of the sea-level (the datum plane), the twenty foot contour has been converted into the zero contour, and each other contour has been reduced twenty feet.

Mould an irregular island on a moulding board, using clay, putty or plaster. Let it have at least two high peaks and several spurs with lateral valleys between, in which streams run to the sea-

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Put this into a tank (sink or tub), and add water until the moulding board is just covered. This may be said to represent half tide (mean tide), and the contact between the island and the water level will be the shore line or zero contour. Call attention to the fact that the spurs project out into the water, and that the shore line enters the reëntrants at the valley mouths. Have this shore line accurately reproduced on a map, according to the same scale. When this is done add water to the tank until the level has risen just one inch, as observed on the sides.

Have the new shore line this observed obtained, studied and mapped in its proper place (which will necessarily be within the old shore line, unless there are overhanging cliffs, which should, at first, be avoided). Mark the shore line on the model with water-proof ink (Higgins') or in some other manner, and then, by adding more water, raise the water level in the tank another inch, making it two inches above the original level.

Study the shore line resulting from this second submergence; indicate it on the map and mark it on the model as before. Continue this process until the model, which should be from six to ten inches high, is completely submerged. Call attention to the fact that the original single island becomes divided into two or more smaller ones, according to the number of peaks, as soon as the cols between the peaks are submerged. Note the result as indicated by the contour-lines on the map.

Emphasize the fact that several small closed contour-lines within a larger one, mean peaks or independent elevations, and not depressions, unless specifically stated on the map.

Draw off the water to its original level. Note the relation of the various shore lines on the model (now again representing contours), and compare with the corresponding lines on the map. Mark the position of the streams on the map, and call attention to the fact that they occupy the places where the contour-lines recede, or bend in toward the center of the circumscribed area.

Study contoured maps, keeping these points in view, and carefully bearing in mind the fact that all contour-lines must be closed, i. e., the two ends of the lines followed in opposite directions must unite.

This is not always shown on the same map, as a contour-line may be continued hundreds of miles before it closes.

Cross Section or Profile.—Draw a line across the map through the center, lettering it A-B. On another sheet draw a line of equal length, lettering it C-D. Placing the sheets so that the two lines are parallel, project the points at which the line A-B intersects the contour-lines at right angles on to the line C-D.

Mark off the respective elevations of the projected points, on the projection lines above the base C-D, which is to be taken as sea-level (zero contour). The first intersection on the line A-B is the shore line, or zero contour line. This is marked on the line B-C. The second intersection on the line A-B is the one-inch contour line. This, in its respective place on the line C-D, is marked one inch above that line (C-D). The third is marked two inches above, and so on.

Care should be taken to note that every contour-line is cut at least twice by the line A-B, and at least two points of the corresponding elevation would appear on the section. When all the points are plotted, connect them by a line, sketching in the details between the contours. Compare this profile with the model.

Sections of varying scales for contour interval may then be drawn, i. e., one-half inch, one-eighth inch on the section representing the one-inch interval on the model and map.

Explain method of making contours by the use of levels in the field.

A. W. G.

Some Things About Samoa. The Samoan houses are very comfortable indeed, for the climate. They are made by setting up posts in the ground in the form of a circle or oval, and then putting on the timbers to which the thatch is fastened. These thatch roofs, which are made from the leaves of the sugar cane, last about five or six years. After the roof is on, the ground is raised underneath to a foot and a-half or two feet, and large stones are placed all around the outer edge to keep this earth from being trampled down, and also to keep in place the finer stones with which the ground is now covered to a depth of five or six inches. The floor is made level, and the fine stones pounded down and made as smooth as it is possible to make loose stones. Over this mats are spread.

The sides of the house are enclosed with a sort of blinds or

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screens, made from the cocoanut leaves braided together. These are so arranged that they overlap, somewhat as shingles do. They are swung together, one above the other, and can all be pushed up and fastened at the edge of the roof. When they are all up the house is open all around, and might be compared to a round or oval tent with the sides tied up.

The native Samoan diet is very simple as a general thing, consisting chiefly of taro, a species of the lily, of which both leaves and roots are eaten; bananas, cocoanuts, breadfruit, fish, and occasionally chicken and pork. They also buy some tinned meat from the stores. In their season there are the different fruits, such as mangoes, pineapples, oranges, limes, citrons, guavas, vees, and the papaw.

The natives do their cooking in a very simple manner. The food to be cooked is wrapped in banana and breadfruit leaves and surrounded by hot stones, and the whole covered with leaves, and left to bake. Some of the food prepared in this way is very delicious. The Samoans eat many things raw, such as green fruit, and various shell-fish, which they gather on the reef.

Their table dishes are simply leaves and cocoanut shells, and their tables small mats made for the purpose. When the meal is over, the food that remains is gathered up and put into a basket, and the surplus leaves are thrown away; so there is no dish-washing; neither is there any need for cupboards or pantries, as a new set of dishes can be had at each meal.

The same room serves for parlor, dining-room, and bedchamber: the cook-house, however, is separate. The natives have no chairs, but simply sit, Turkish fashion, on mats. The visitor, instead of being served, as the English custom is, with a cup of tea and sweetmeats of some sort, is offered half a cocoanut shell full of kava, the great native drink, and perhaps some of the native food.

The bed is simply a heap of mats of varying thicknesses spread on the stones which compose the floor. The lava lava, or loin cloth, serves as a covering, while the pillow is a joint of bamboo with two legs at each end. Yet the people seem to enjoy their repose in a manner quite remarkable to those accustomed to the American bed furnishings. In the morning the chamber work is very quickly done; the lava lava is put on as a garment, and the mats are rolled up and placed on poles overhead.

The daily program of the Samoan is something like this: In the early morning he works for an hour or two in his taro patch, among his bananas, or whatever he may have growing. Then he has breakfast, and afterward sits about, talking and smoking with the family. Smoking is a great curse to the Samoans; both men and women and even little children six and seven years old are addicted to the habit. After this he lies down and sleeps for two or three hours during the heat of the day. When he awakes he goes out to play cricket, or engage in some other sport for the remainder of the afternoon. The evenings are usually spent playing cards, chatting, or in the siva, or dance.—Med. Mis., Feb., 1898.

The Mus-tagh-atu Mountains. Like a mighty outpost against the Central Asian deserts, the Mus-tagh-ata, one of the highest mountains of the world and surely the highest of the Pamir, rises 25,950 feet, and is at the same time a worthy continuation of the tremendous ranges—the Himalaya, Kuen-lun, Kara-Koram, Hindu-Kush, which meet here on the roof of the world. It constitutes the culminating point of the meridianal chain which brings the Pamirs to an end in the east, and is called Mus-tagh, or the ice mountains, and the name Mus-tagh-ata, or the father of the ice mountains, points at once to its superiority.—Geographical Journal, March, 1898.

Coast Line of United States. The length of the coast line of the United States, according to the Coast Survey, is 5,715 miles, embracing 2,349 miles on the Atlantic Ocean, 1,556 on the Gulf of Mexico, and 1,810 on the Pacific Ocean.—Evening Post.

Commercial Conditions at Rouen.—How comes it about that in the present year the Rouen Chamber of Commerce is distressed in the matter of pilotage fees—£32 for a ship of 1,000 tons to reach their city from the open sea? The worthy burgess members want to effect a reduction of some 30%, and so enable the shipping trade of Rouen to double and treble its turn over. But in steps inexorable Father Seine and says: "No, no; am I to have my turnings and twistings for nothing? You have built your city forty miles from the sea as the crow flies, but seventy

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as the river runs, and you must pay for your idiocy!" In other words, the mouth of the Seine is of such a winding character that a double set of pilots is necessary, one at Quilleboeuf for the estuary, and the other at Villequier for the river proper, and no amount of political or any other economy can get rid of this physical fact. The navigation of waters—riverain or oceanic—is a fit subject for commercial geography teaching, and that teaching should consist in the application to test cases of physical facts. Given, for instance, a navigable but winding river mouth, what is the result? Answer: Canals or heavy pilotage fees, e. g., Rouen.

REVIEWS.

E. R. W.

Hydrographic Charts.—A notice lately received from the Hydrographic Office of the Navy Department in Washington states that it is no longer possible to distribute without charge copies of the Pilot Chart of the North Atlantic and North Pacific Oceans, and that anyone in the future desiring copies of these monthly charts can obtain them at the price of ten cents a copy.

This notice announces a change in the policy of the Hydrographic Office from that of several years ago, when it was understood that undistributed copies of the Pilot Chart could be had without charge for use in schools.

As these charts contain a great deal of current and statistical information concerning the oceans, it is to be hoped that this slight charge placed upon the charts will not prevent their finding occasional use in schools.

W. M. D.

REVIEWS.

Geological Map of England and Wales. By SIR ARCHIBALD GEIKIE, D. Sc., LL. D., F.R.S. With Descriptive Text. Published with Government Authority. Edinburgh, John Bartholomew & Co., 1897.

This geological map of England and Wales has been reduced by W. F. Bosse, under the direction of Sir Archibald Geikie, Director-General of the Geological Survey, who has specially made some sections for it, and is issued with government authority. It has

been drawn on Messrs. Bartholomew's ten-inch to the mile England and Wales, the best reduction of the ordnance survey sheets we possess on that scale; and so it forms a comparison map to the geological map of Scotland published some years ago.

Fifty different rock formations are shown on the map, which is a marvel of clear and accurate work. It is, therefore, one of the most complicated maps ever printed; but, in spite of this, the tints are so well chosen that the map can serve equally well as a wall map for class purposes, as one to put in one's pocket when travelling in England, or to examine in detail at home. Of course, it does not supersede the four-inch or the one-inch geological maps which the teacher will need to use in his own locality, but it is indispensable to every teacher of the geography of Southern Britain. The teacher will find a most readable and helpful account of the geology of England and Wales in the small book of letterpress, which is written by Sir Archibald Geikie and accompanies the map.

The map has one more merit: It is published at the remarkably low price of 12s. 6d., mounted on cloth.

Natural Advanced Geography. By Jacques W. Redway, F.R.G.S., and Russell Hinman, author of "The Eclectic Physical Geography." Pp. 160. American Book Company, N. Y., 1898.

The names of Redway and Hinman as editors of the Natural Advanced Geography promise thorough treatment whatever their point of view, and this, the preface tells us, is "Man in his relations to his physical environment."

The book takes up at once a broad, general view of the whole world, the astronomical relations and all the rest of the physiographic field is touched upon, with the distribution of life forms, and a special treatment of man in general. This whole field covers 43 pages, including copious illustrations; so, although it is well written, accurate and strictly up to date, it is very condensed, perhaps too much so for the best results.

The remaining 115 pages are given to a more special treatment of parts of the earth, as continents and countries. Of this about 43 pages is given to the United States. This furnishes a gener-

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ous and adequate treatment of the one country, though it necessitates an uncomfortable brevity of treatment of all other countries. For example, Japan gets a special treatment of only one column, and Great Britain only two columns. All South America gets only about seven pages, one-third of which is illustration. In spite of this brevity, the material given is admirably chosen and well treated.

At the close of various chapters are suggestive outlines for topical work—a good idea. References for outside reading are also good. The text is plentifully supplied with questions and suggestions; for example, "What seas and countries bound the German Empire?" "Bound the Netherlands. What sea indents the coast?" It seems like a waste of printer's ink. Sometimes the questions read as though they ought to be followed by the word "guess," as, "Of what is the Empire of Japan composed?" Some day we will be brave enough to write a text-book and leave the questions out.

As a rule a perspective diagram is not a success when applied to showing the earth's attitude toward the sun in change of seasons, and those on page 23 are no exception. In the second column, same page, is a diagram for the same purpose, of the greatest value. The term "desert" is, by implication (p. 29), limited to a "warm, dry region." No provision is made for central Greenland and Antarctica under the term.

"Kettle hills" (p. 51) is a misnomer. "Kettle moraine" is properly used, having reference to a part of a terminal moraine pitted with kettle holes.

The book has a wealth of pictorial illustration, which is, as a rule, well chosen and of high teaching value as accessory to the text. The quality of this illustration is, on the whole, disappointing. It is to be regretted that more use was not made of half-

tones in the early part of the book, for half-tones when taken directly from the photograph give us a truth of detail which the artist does not.

Perhaps the poorest illustrations in the book are the collections of animals, half-tones from wash drawings. Zoologically they will not bear too close inspection.

The text is supplied with a generous list of maps, but an index is unfortunately wanting. The maps in black and white are exceptionally fine, and of the highest teaching value. Many of them can be specially commended, such as the little series showing the progress of geographical discovery, and the little maps all through the book showing climatic conditions, plant distribution, areas of productions, populations, standard time, railways and others. The absence of numeric statements accompanying the maps is unfortunate, for an opportunity is thus lost to give an actual value to the relative truth imparted by the map.

The extensive use of these little maps, and the pictorial scheme of showing relative productions, as, for example, one bag of wheat by the United States, and three bags by all the rest of the world, is a welcome recognition of the well-established pedagogical principle that sight leads in the acquisition of sense perceptions.

The total absence of Mercator's projection is noticeable. The little paired hemispheres on the modified globular projection are not quite satisfactory. A better substitute in some ways is found in the orange-peel polar projection, which retains a proper attitude and area of northern lands, avoiding the distortion of the Mercator while attaining comparative northern latitudes. For general use, however, it is not a good substitute for the Mercator.

The least satisfactory part of the book is some 20 pages of colored maps. The colors in the physical maps are glaring and inharmonious. A commendable feature is the uniformity of scale of the various maps in the series, but an exception should not be made of New England.

One of the best features of the map work is the series of finely drawn insets of the prominent city and its environs. This plan could be largely extended with distinct advantage. For example, on p. 67 instead of the inset of New York and Pennsylvania, which has almost no additional value over the general map, we might

have the Niagara Falls region, Philadelphia, Washington, St. Louis, etc.

In the political map of Europe, p. 118, the color scheme still retains the old eastern and southeastern boundary of Russia, obsolete years ago. True, a pink line with a label in one place suggests a correction, but it is *only* a suggestion.

Alaska really deserves more attention and a larger and better map.

Shaded relief maps, so common in recent texts, are conspicuous by their absence, only one being given. In their place contour lines and tinting are used. The plan is admirable, and should have been applied more generously to bathymetric data. Only one subaqueous contour is given, that of 1,000 fathoms. The 100 fathom line would be of more value. The ocean on the whole gets very scant attention.

A full-page map of South America is repeated within three pages, with no gain apparent. Insets here of the environs of Rio de Janeiro and Buenos Aires would be grateful additions. There is really small excuse for the constant duplication of maps, physical and political. More skill in map making would put all the advantages of both maps into one without crowding. A map may be loaded with information, physical and political, and still be legible, and every bright boy and girl would be thankful for the addition. I need only cite Longmans' School Atlas for an approach to the quality of work we might have.

On the whole, all our colored maps in school geographies are inferior. When shall we have in our text books the accurate artistic map work of England and Germany? There has been almost no improvement in the quality of our school maps in the last twenty-five years.

J. P. G.

CURRENT LITERATURE.

Appalachia, Boston. March. Scudder, The Alpine Orthoptera of North America; Thompson, At the Headwaters of the Bow; Habel, The North Fork of the Wapta; Balch, Reminiscences of Tyrol; Cogshall, A Trip to the Summit of Orizaba; Douglass, The Altitude of Popocatepetl and Orizaba; Douglass, Effects of

High Mountain Climbing; Dodge, A Winter Trip to the Top of Mts. Washington and Adams in 1892.

- Geographical Journal, London. April. Feilden, Visits to Barents and Kara Seas, with Rambles in Novaya Zemlya, 1895 and 97; Pike, A Cruise on the East of Spitzbergen; Cavendish, Through Somaliland and Around and South of Lake Rudolf; Hedin, Four Years' Travel in Central Asia; Dr. Hassert in Upper Albania; Stephenson, Notes on a Section of North Mexico; The Caucasus; East Siberia.
- National Geographic Magazine, Washington. April. Scid-more, The Northwest Passes to the Yukon; Galland, Overland Routes to the Klondike; Dall, The Future of the Yukon Goldfields; Nelson, Notes on the Wild Fowl and Game Animals of Alaska; Greely, Climatic Conditions of Alaska; Dall, A Yukon Pioneer, Mike Lebarge; Emmons, Alaska and Its Mineral Resources; Perkins, The Civil Government of Alaska; Evans, Some of the Conditions and Possibilities of Agriculture in Alaska.
- Scottish Geographical Magazine, Edinburgh. April. Gannett, The Material Growth and Present Condition of the United States; Sutherland, Along a Shan Road, Southern Shan States, Upper Burma; Antarctic Exploration.
- Société Royale Belge de Géographie, Brussels. Tanaka, Archipelago of Japan; Delvaux, Vasco da Gama and the Maritime Discoveries of Portugal.



JOURNAL OF SCHOOL GEOGRAPHY

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE COMMON-SCHOOL TEACHER OF GEOGRAPHY.

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One dollar a year in advance. Single copies 15 cents. Subscriptions should be sent to the Journal of School Geography, 41 North Queen Street, Lancaster, Pa.

Mss. intended for publication, books, etc., intended for review, and all correspondence, except concerning subscriptions, should be sent to the responsible editor, Richard E. Dodge, Teachers College, 120th Street West, New York City.

CLIMATIC NOTES MADE DURING A VOYAGE AROUND SOUTH AMERICA.

The ideal method of teaching meteorology is unquestionably this: to supplement the knowledge of the meteorological conditions of the student's home district, gained by his own observations and by laboratory work on the daily weather maps, by a study of the climates of other parts of the world, at first as these climates are presented in books, and then by the personal acquaintance with the different types which travel gives. However well a teacher may know his text-books, he can never enjoy the feeling of personal acquaintance with other climatic conditions than his own, unless he has had the privilege of observing these conditions for himself. This meteorological field work, if it may so be called, which can be done by anyone well equipped by previous study who has the good fortune to travel, is a step in meteorological education whose value cannot be overestimated.

Of the truth of the latter assertion the writer has lately had abundant proof. He has, during the past year, made a somewhat extended trip around South America, and although he had, on starting, what seemed a very fair knowledge of the meteorological conditions of the different wind and calm belts through which he

was to pass, the personal experience of these conditions, gained on this trip, has given him a living knowledge which is incalculably superior to that which he possessed before. The journey has been so very beneficial to him in this way that he wishes to make it of some value to other teachers, and in this hope he has, in the present paper, summarized some of the more important lessons he himself has learned. It is not the intention of this article to give full accounts of the climates of the different places visited, but only to call attention to such climatic peculiarities as particularly attracted the writer's notice.*

The route taken was as follows: From New York to Rio de Janeiro, with brief stops at Pernambuco and Bahia; Rio to Buenos Aires, Buenos Aires to Valparaiso, via the Falkland Islands and the Strait of Magellan, and Valparaiso up the West Coast of South America to Panama. The advantages of such a journey from a meteorological point of view are very many. Starting from New York the voyage to Rio takes one through the horse latitudes, the northeast trades, the doldrums and the southeast trades, ending on the Tropic of Capricorn. From Rio south to Buenos Aires and hence to the Falklands, the horse latitudes of the southern hemisphere are passed through, and at the Falklands we are well within the latitudes of the prevailing westerly winds, which continue during the passage of the Strait of Magellan, and for some distance up the west coast of South America. The voyage up this west coast is intensely interesting, because it extends from the southern districts of Chile, where rainfall is abundant, up past regions of gradually decreasing rainfall until the desert belt of northern Chile and Peru is reached, and then further north to the equator, where rain is once more abundant. No better horizontal cross-section of the atmosphere can be obtained than that which such a voyage around South America affords.

It may be well at this point to review the main facts concerning the general conditions of winds and rainfall in South America. Interesting as that continent is from a climatic point of view, its chief interest lies in its rainfall distribution as determined by the

*The instruments used in making meteorological observations on this trip were the following: Richard frères barograph; maximum and minimum thermometers; sling psychrometer; aneroid barometers; water temperature thermometer, and Dines' Patent Pressure Portable Anemometer.

great wind and calm belts across which it extends, and by its own physical features. Reaching roughly from lat. 10° N. to 55° S., it stretches from the northeast trade belt well into the latitudes of the prevailing westerly winds of the southern hemisphere, with the equatorial rainy belt, the southeast trade and the horse latitudes coming in between. This immense extent, across these diverse belts, ensures striking differences in the rainfall of different parts of the continent, but the physical features of its surface are also of the greatest importance in controlling the precipitation.

The essential features in the rainfall of South America were first distinctly emphasized by Darwin. He stated that in the latitudes of prevailing easterly winds the eastern side of the continent and the eastern slopes of the Cordillera are well watered, while the western slopes are dry. On the other hand, in the latitudes where the prevailing winds are from the west, the western slopes of the mountains have the precipitation while the eastern side is dry. In accordance with this brief statement, which really gives a compact summary of the general rainfall types of South America, we find that the rainfall along the northeastern coast (Venezuela, the Guianas, northeastern Brazil), which lies more or less at right angles to the course of the northeast trades, is considerable. After passing the highlands the winds continue on their course inland, but the rainfall is not so great as on the coast until the Cordilleran range is reached, on the western side of the continent. In climbing up the slopes of this range, the winds must necessarily deposit a very large part of the water vapor they contain, and hence the rainfall over the eastern base of the Andes is very heavy, while the narrow western coastal strip is left dry. In the same way, the mountain ranges along the coast of southeastern Brazil, against which the southeast trades blow and across which they climb, have. abundant rainfall, and the whole interior country from there up to the base of the Cordillera, is sufficiently watered, the precipitation becoming heavy, as is the case in the northeast trades, on the eastern slopes of the western mountains, while the western coastal strip again remains dry. In the northern portion of the continent the simple trade rainfall is considerably complicated by the presence of the equatorial rainy belt as well, but a discussion of these complications is not necessary here.

It is worth noticing, in passing, that the rainfall conditions of South America south of the equator in the latitudes of the southeast trade, are different from those of the other great southern hemisphere continent. While South America has its greatest mountain range on its western side, and hence the easterly winds can furnish a sufficient rainfall for by far the greater portion of the continent lying within the tropics, Africa has its highest mountains on the eastern coast, and, therefore, the southeast trade, which in South America waters the interior country of southern Brazil, in the case of Africa deposits its moisture as soon as it leaves the ocean, on the mountains near the coast, and continues across the interior as a dry wind, thus causing the barren expanse of the Kalahari desert.

In the latitudes of the prevailing westerly winds, as noted by Darwin, the rainfall is on the western slopes of the Cordillera, and the low-lying eastern country, stretching from the base of the mountains to the Atlantic, is left in the rain shadow. In the case of southern Patagonia, however, the barrier on the west, owing to the diminishing heights of the mountains toward the south, is less effective than it is further north, where the altitudes are greater. Hence some rainfall comes to the country on the east. There is also a considerable precipitation from winter cyclones, whose influence extends over the low-lying Patagonian coast from the neighboring Atlantic.

It is not the purpose of this article to enter into a detailed account of South American rainfall, but only to recall its chief features, in order that the brief climatic notes may be more intelligible to the reader. The migration of the different wind and calm belts, and of the rainfall belts, with the seasons; the seasonal changes of pressure and of winds, and other similar matters are, therefore, passed by without mention.

The start from New York was made on June 5. The first three days brought light variable winds; fair or cloudy weather; high humidity (85%–95%), and gradually increasing temperature and pressure, and on the fourth and fifth days (noon positions lat. 29° 43′ N., long. 59° 23′ W., and 26° 58′ N., 55° 41′ W.), typical horse latitude weather was experienced. The wind was light, from southwest or west southwest; the air, much drier than on the preceding

days, was fresh and bracing; some small cirrus and cumulus clouds flecked the sky, and an occasional shower of short duration could be seen on the horizon, falling from some overgrown cumulus cloud. In spite of the fact that the great mass of air in these latitudes is descending, there is not infrequently a sufficiently active upward diffusion of water vapor during the daytime to produce occasional showers. These showers, however, are of short duration, and are unaccompanied by squall winds. On June 10 the diurnal variation of the barometer, seldom distinctly seen in our latitudes, where the pressure control is cyclonic, became apparent.

The barometer was highest on June 10, and on the morning of June 11 (lat. 23° 45' N., long. 52° 30' W.), and then began to This fall, together with the change in wind direction from southwest to southeast, and a long ocean swell from northeast, showed a gradual cessation of horse latitude conditions and the coming of the trade, the fall in pressure being due to the fact that the ship was leaving the tropical high pressure belt, and approaching the equatorial belt of low pressure. These prophecies of the coming trade were fulfilled on the following day, June 12 (lat. 20° 26' N., long. 49° 45' W.), when, with an east-southeast wind, changing to east by south, and, on June 13, to east and east-northeast, and with the well-known trade cumulus as the dominant cloud type, the chief signs of trade weather were present. For three days the trade conditions lasted, the mornings beginning with a clear sky, and this being followed by increasing cloudiness towards noon, and possibly by showers in the afternoon from small cumulo-nimbus clouds, the clouds dissolving rapidly after sunset. The remarkable steadiness of the wind, both in direction and velocity; the wonderful uniformity in the conditions from day to day; the attractive pictures of blue sea with white caps, and of blue sky, with the trade cumuli all bending forward in the same way, have been often described, but can not fail to charm the traveller. The temperatures observed were between 77° and 80° through the trade belt, and the relative humidity between 70% and 80%. The diurnal quality of the weather in these latitudes, with the regular diurnal variations of temperature, pressure and cloudiness, is in striking contrast with the irregular cyclonic weather changes that are most common over the United States. Only in summer, when the cyclonic control becomes less, do we approach the even conditions of these lower latitudes.

Text-books and wind charts are apt to give the student a rather rigid idea of the great wind and calm belts of the world, and hence most travellers undoubtedly expect that they will pass suddenly from the northeast trade into the doldrums, and from the doldrums into the southeast trade, and vice versa. But there is usually no such distinct line of demarkation. The writer had an excellent illustration of this in the gradual transition which was noted on June 15, in lat. 10° 02′ N., long. 44° 02′ W., between the northeast trade and the doldrums. At this season of the year, when the sun is north of the equator, the northeast trade does not, in this portion of the Atlantic, extend nearer the equator than about lat. 7° N., the equatorial rainy belt being at this time as far north as After three days of characteristic trade conditions there came a gradual decrease in wind velocity and a decided increase in the number and duration of the showers, both of these features being indications of approaching doldrum weather. On June 15 there was an interesting mixture of trade and doldrum conditions. The day was marked by high temperatures and much higher humidity (over 90%) than had previously been observed, and by a succession of very heavy tropical showers from a dull, gray, over-The atmosphere was very muggy and oppressive, and the sea confused. These features are all distinctly characteristic of the doldrums, but the chief respect in which the weather of the day did not fulfil doldrum conditions was in the fact that there was a steady easterly wind all day, this being a continuance of the trade. The combination of these two types, at the latitude at which the two wind belts joined, was most interesting. interest was continued throughout the following day (lat. 6° 33' N., long. 42° 39' W.), which brought a return to trade conditions, interrupted by one heavy tropical shower at 10 A. M. The water temperature of this day reached 83.5°—the highest noted on the voyage—and the air temperature reached 84.9°.

The writer read somewhere, years ago, in an account of the doldrum rains, that the amount of fresh water which falls in one of these heavy showers is so great that the surface water of the ocean

actually becomes fresh, and he had often, in the course of his teaching, used this as an illustration of the remarkably heavy rainfall of those latitudes. The atmosphere of incredulity which pervaded the class-room whenever this story was told, caused him to make a resolve to test the truth of the report at the earliest opportunity. This opportunity came on June 15th. After a very heavy shower of half an hour's duration, some of the surface water of the ocean was drawn up in a bucket, and on being tasted was found to be almost perfectly fresh. The writer can therefore assure teachers that they may use this illustration with perfect confidence.

According to the June "Pilot Chart of the North Atlantic Ocean," the northern limit of the southeast trade for that month in the longitude at which the writer crossed the equator was 3° 30' north. The noon position of the ship on June 17th, was 3° 29' north, long. 40° 44' west, the latitude, therefore, being almost exactly that at which the southeast trade was to be expected. spite of his expectation of picking up the trade at this place, the writer could not help being surprised that the southeast wind began to blow between 8 A. M. and noon of this same day, thus verifying, in a most striking way, the forecast made on the pilot chart. The wind on the preceding day had been decreasing in velocity and veering from northeast to east-southeast, and had been followed, during the night, by heavy showers—a touch of doldrum The transition from northeast to southeast trade was conditions. thus made gradually, and without sudden contrasts in weather conditions. No simple, typical doldrum weather was experienced, but, as noted, the doldrum type was confused with some trade These intermediate latitudes between the two trades are very variable in their weather, the trade or the doldrum conditions predominating, according as some external controlling causes may determine.

The lowest pressure noted on the voyage was observed on June 17th, when the crossing was made from northeast to southeast trades, this record serving to emphasize the fact that here, between the two trades, is the long belt of low pressure whose axis is known as the barometric equator, and which, itself due to the presence here of the belt of highest temperatures (heat equator),

is the controlling cause of doldrums and trades, as well as of the general circulation of the atmosphere. The passage of the heat equator was also recorded in the registration of a maximum temperature of 94.2°, the highest noted during the trip.

For three days typical trade conditions prevailed again, but showers from overgrown cumulus (cumulo-nimbus) clouds were noted a good many times. In fact, in both northeast and southeast trades such showers were found to be not uncommon during the afternoon, although the general impression gained from many published accounts is that rain very rarely falls in the trade wind belt over the ocean surface.

ROBERT DE C. WARD.

Colon, Colombia, January, 1898.

(To be concluded.)

PRELIMINARY REPORT

OF THE COMMITTEE ON PHYSICAL GEOGRAPHY TO THE NAT-URAL SCIENCE DEPARTMENT OF THE NATIONAL EDUCATIONAL ASSOCIATION.*

To the Natural Science Department of the National Educational Association.

The committee appointed to consider the course in Physical Geography in secondary schools would respectfully report as follows: The decision of the Department at the Milwaukee meeting, to double the membership of the several natural science committees, occasioned serious delay in the work. Diligent efforts were made to secure the additional appointments for Geography. It was found in March last that three vacancies still remained, but in order to prepare a report in time for the meeting at Washington, with the approval of Professor C. S. Palmer, the General Secretary of the Committee, work was undertaken, the committee being constituted as follows:

*The Chairman of the Committee will be very glad to receive comments, suggestions and criticisms from any one interested. It is to be hoped that this paper may bring out much discussion, for only through discussion can any progress be made.

New England Association, William North Rice, Professor of Geology, Wesleyan University; W. H. Snyder, Master in Science, Worcester Academy.

Middle States Association, Albert Perry Brigham, Professor of Geology, Colgate University. (*Chairman*); J. M. Jameson, Professor in Pratt Institute.

North Central Association, G. L. Collie, Professor of Geology, Beloit College.

Southern Association, Collier Cobb, Professor of Geology, University of North Carolina.

American Association for the Advancement of Science, Ralph S. Tarr, Professor of Dynamical Geology and Physical Geography, Cornell University.

Department of Natural Science, National Educational Association, W. M. Davis, Professor of Physical Geography, Harvard University; R. H. Cornish, Assistant in Physics, Girls' High School, New York City.

The Chairman prepared a preliminary list of questions for critcism by the several members of the committee. The following circular of inquiry was then issued as a basis of work for members of the committee and others:

- 1. Should a high school offer the following subjects under the general head of Geography? Mathematical Geography, Meteorology, Oceanography, Physiography of the Land, Distribution of Organisms, Economic Geography, Geology. If Geology is included, what parts of the subject should be taught? What topics should Economic Geography embrace?
- 2. In what year or years of the high school course should Physical Geography have place? What studies should precede or follow?
- 3. What preparation in Geography is to be expected from the elementary schools?
- 4. Outline of work for one and two year courses, including order and time allotment for subjects named in 1, and number of periods per week.
- 5. Place of Geography in college entrance requirements. Should Geography be elective or required in so-called English courses? In classical courses? To what extent may Geography

be presented as a substitute for other subjects, particularly for other sciences?

- 6. Text-books.
- 7. Laboratory work; how related to lectures and recitations; outline of laboratory courses; use of note books; amount and character of field work to be done; modifications in field work or substitutions for it, in city schools.
- 8. Standard equipment of maps, models, photographs, lantern slides, specimens and apparatus, for class room and laboratory.
- 9. Lists of books in Geography recommended for school or teacher's library.
 - . 10. Any other phase of the subject deemed important.

The several individual discussions thus prepared were embodied in this report, which was amended and approved at a meeting of the committee held in Springfield, Mass., July 1-2, 1898. Only those who were able to be present at this meeting have signed the report. The gentlemen who were not present cannot be held responsible for the views here expressed, but they have all made valuable contributions to the paper and are believed to be in accord with most of its positions. In the case of the signers of this report, it is not to be understood that every one approves of every proposition announced as the opinion of the majority of the committee, though all do find themselves in cordial harmony with the views of the report as a whole.

I.

The committee find themselves in agreement as to the scope of physical geography and as to the topics which should constitute parts of a high school course in this subject. The meaning and general scope of physical geography have never been better expressed than in the words, "the physical environment of man," used by the conference on geography in their report to the Committee of Ten. On the whole, the term "physical geography" is to be preferred to physiography, as having in common usage a more precise definition. Physiography in the English sense of a general introduction to all sciences, is too broad; and in the sense in which it is now employed by some American students, it is not broad enough. The ideal high school course in physical geog-

raphy will neither be too general and fragmentary, nor too special and difficult. The subject should be carefully held to the leading idea of the physical environment of man, and it should be the aim to exclude a number of subjects frequently treated under physical geography, but more appropriately included under other heads, for example, purely astronomical matter, certain principles of physics, the classification of animals and plants, and tables of the geological periods. Important and interesting as these subjects are in their proper connections, it is believed that a better mental discipline will be obtained from physical geography when all its parts are closely joined to its leading theme. It may thus provide an intellectual training comparable in value to that secured from physics, mathematics or language, in which continuity of theme is so well maintained.

It is agreed that the earth as a globe, the atmosphere, the ocean and the lands, should be the principal themes of the course. Here one may, if preferred, use the more formal terms, Mathematical Geography, Meteorology, Oceanography and Geomorphology. A serious objection to these terms is that they do not sufficiently take human relations into account. If, however, they are employed, it is to be understood that the character of high school work, as well as the limited time at disposal, forbid the giving of extended courses in these subjects. They must all, and especially the three former, be given in an elementary way, and all must be taught with the motive and from the special point of view of physical geography as defined above.

The Distribution of Organisms should not be taught with reference to zoölogical and botanical classification, but in exposition of the organic environment of man, and as itself controlled by physiographic and other influences. Pupils should be taught the tendency of species to diffuse themselves and the limitation of the tendency by climatic, oceanic and topographic barriers. It will, for example, be easy to teach the influence of temperature in the establishment of zones of animal and vegetable life. The difference in the effects of deep and shallow seas as barriers to distribution should be illustrated by reference to Wallace's line and to the faunas and floras of continental and oceanic islands. The depth and texture of soils and the quantity and distribution of ground

water should be related to their control over the distribution of plants and population. The whole subject may be treated by incidental references in the chapters on the atmosphere, the ocean, and the lands, or may form the theme of a supplementary chapter, or the two methods may be combined.

Throughout the course in physical geography, every opportunity should be taken to illustrate the relation of economic products to physiographic control on the one hand, and to the distribution and condition of mankind on the other hand. If time allows, a summary of the subject might be added as a closing chapter.

In the next section of this report reference will be made to more advanced elective courses of a geographic nature, which may have place in the high school curriculum.

II.

The committee recommend that the course in physical geography be generally placed in the first or second year. If the elements of physical geography have been used as a basis for work in geography in the elementary schools, then physical geography in the high schools might perhaps be a relatively advanced course in the fourth year, using the materials afforded by the study of physics, chemistry and biology in the previous years. It is, however, the opinion of the majority of the committee that under any conditions the study of physical geography should come early in the high school curriculum. Certainly this is the case as matters now stand. It would be unwise to allow pupils to reach the age of eighteen years, or thereabouts, without attaining the broad way of looking at the earth that physical geography, of all subjects, gives.

Additional reasons for introducing the subject at an early stage are found in the fact that only a small part of the pupils who enter the high school complete the curriculum, and in the further consideration that the subject can, without deranging the general order of studies, in some cases be taken by those who are preparing for classical courses in college. The committee deem it entirely practicable to teach good courses in elementary physical geography without previous courses in other sciences. The qualified teacher will readily supply any needed chemical or physical principles. In some cases rudimentary instruction in physics and chemistry has been given in grammar school courses.

Advanced elective subjects of a geographic nature may be offered late in the curriculum. Among these is geology. It is agreed that the larger share of time should be given to the dynamical and structural phases of the subject. Only the simplest facts about minerals and rocks can be given, and such difficult dynamical subjects as metamorphism and vulcanism can only be treated in a general way. It will be possible for a competent teacher to give effectively the elements of historical geology, especially if good museums or localities for fossils be at hand. Detailed instruction in historical geology is too difficult for high school pupils and should not be attempted.

The course in geology should, if practicable, follow those in physics and chemistry, probably in the last year of the curriculum. In dynamical and structural geology, the subjects treated will necessarily be to some extent the same as those in the earlier work in physiography. But the treatment of these topics in the course on geology will be in less degree simply descriptive. For instance, in the earlier course some general ideas of the work of running water and the development of topographic forms can be given. In the later course the work of running water should be explained in relation to the laws of energy, the stream being considered as a falling body. In the course in physiography the general action of the atmosphere in the decay of rocks can be presented, but in the later course on geology, the nature of the chemical changes involved in weathering should be illustrated. In general, dynamical geology should be regarded as the chemistry and physics of the globe, and the conduct of this course must, therefore, presuppose a knowledge of chemistry and physics on the part of the student. If the pupil has studied zoology or botany, or both, during the early years of the curriculum, it will be possible to make an outline of historical geology more intelligible than it could otherwise be.

The committee approve of the suggestion that an advanced elective course in meteorology may be introduced, if the number and qualifications of the teachers render it practicable. Such a course would probably come in the last year, accompanying or following a course in physics. Such a course would sustain to the meteorological chapters in physical geography a relation similar to that which the course in geology bears to that section of physical geography which concerns geological processes.

If a course in astronomy is offered in the later high school years, it would follow as a natural expansion of the chapter on the earth as a globe. If a later course in physical geography should be introduced, it might be either an expansion of the first course, with more advanced treatment, or a course on the physical features of some land area, preferably the United States.

Although it has seemed worth while to give brief indication of the nature of the four advanced courses above outlined, it is not desired to imply that high schools should at present offer all, or indeed, any of them. The chief interest of the committee is in the establishment of a well considered elementary course.

III.

It may be reasonably expected that in the teaching of geography in the elementary schools a good beginning will have been made in acquainting the pupil with the conceptions of physical geography. Geographical teaching has greatly improved in the last two decades, and much is to be expected in the near future from the current agitation in this field. Frye's Complete Geography, and the Natural Advanced Geography by Redway and Hinman, illustrate the kind of knowledge which may be expected to be acquired in the grammar schools. Teaching that deals with mere matters of location may with advantage be replaced by the introduction of the causal notion.

IV.

The committee desire to emphasize at the outset that no one curriculum can be the best for all high schools. No outline of work can be made to fit all conditions. It is of doubtful utility to give to teachers at large anything more than a very general outline, which may offer suggestion and prove a help and incentive to better things. Not less than four periods per week for one year should be assigned to the proposed elementary course in physical geography. Five periods would be better. Periods of less than forty-five minutes each would be inadequate, and in any case two periods per week should be scheduled together, to be used if desired, for field or laboratory exercises.

Of the leading subjects, the earth as a globe, the ocean, the air

and the land, the first should occupy the least time, and the others should have an increasingly larger allowance, in the order given. Adequate treatment of the features of the land will require as much time as the other three subjects combined, and it may be more. If the distribution of organisms and economic geography are treated as separate sub-topics, the time allotted to them must necessarily be short. As regards the whole question of proportion it must again be said that much depends on the teacher and the environment. A teacher in a school situated near the ocean might give much attention to the features of the shore line, while one in the interior might give a larger share of attention to plains or mountains.

It is not deemed necessary to present in this report detailed outlines of teaching material. Recourse should be had to textbooks, school journals and especially to the report of the conference on geography to the Committee of Ten.

Nor is it thought best to give estimates of time for the advanced elective courses which have been suggested, believing that time allotment must vary with the views of teachers and the conditions of schools. If the Association desires the committee to go further into the question of outlines, they will be glad to receive instructions on that point.

V.

Recalling the fact that the Committee of Ten place physical geography as a requirement in the first year of all high school courses your committee desire to express their agreement with this indication of the importance of the subject, in the hope that it may be made accessible to all. The committee would, however, hesitate to propose the prescription of the study for all, but do strongly urge that physical geography be required in all English high school courses. They also believe that it should be elective in classical courses, either on the same footing with all the other sciences, or in a position secondary to physics as indicated below.

The attention of educators has been of late repeatedly called to the truth that a four years' course consisting almost exclusively of classics and mathematics, with scant recognition of English literature, practically no modern history, and no physical or natural

science, is a course so disproportionate and unsymmetrical as to be a monstrosity. The relation of the different educational institutions to each other ought to be such that a course preparatory to college will also be a course well adapted to fit the student for the later work of life and for social and civil duties, in case he should fail to take a college course. It cannot be claimed that the present classical course in high schools, constructed with reference to the classical course in colleges, makes any approximation to this The student who has completed a high school course in preparation for the classical course in college, has gained, not a tolerably complete and symmetrical education as far as it goes, but a wretched torso of an education. Nor is the exclusion of science injurious only to those whose studies are interrupted at the end of the high school course. For those who enter college, the ignoring of the study of nature in preceding years tends to unfit them for success in such studies. Their powers of observation and imagination of physical phenomena are well nigh atrophied by disuse and they have lost their native curiosity about the world in which they live. It would tend to correct this evil if a certain amount of science were required for admission to the classical course. geography would be one of the most suitable subjects to be thus required, but in the present unsettled and transitional condition of our educational system, it would probably be better for the colleges to allow an option among several scientific subjects.

Taking the point of view of the college, the sentiment of the committee is that physical geography should not be required for entrance to any of its courses, but that the college should accept it as a part of the preparation for any course, when pursued for not less than one year, provided the teaching has attained a proper standard of excellence. In its relation to physics, chemistry, zoölogy, botany and physiology, several members of the committee believe that geography should stand on a perfectly equal footing, as an alternative requirement, but some would assign to physics distinctly the first place. Those who take this view, however, would insist that geography be accepted as an alternative for any other scientific subject. The college should not fail to set serious tests in geography, where given at all.

VI.

The number of text-books which represent the best current standards of high school geography is not large. Several now before the public are fairly well adapted for class use. Their titles will be found in the annotated list to which reference is made later in this report. In the use of these books, as well as in the preparation of new ones, it is hoped that the definition of the subject, as already given, will be carefully regarded. The earth in relation to man should receive sustained emphasis, and irrelevant scientific matter should be reduced to a minimum. A number of good text-books are available in the subjects suggested for advanced elective courses.

VII.

Field and laboratory work should receive emphasis in every high school course in geography. So far as practicable, the lectures, discussions and recitations should be related to such work. Notebooks should be carefully kept, but their importance should not be emphasized in an artificial way. It is possible for a pupil to make a handsome note-book while entering little into the spirit of the subject.

Field work during the open season should take the place of at least half of the laboratory work if conditions allow. It must not be forgotten that the field is, from one point of view, an out-ofdoor laboratory. The teacher must plan the work according to circumstances, but it should certainly include practice in the making of sketch maps, study of the development of land forms, and observation of the distribution of plants on a small and varied area. In most cities except the largest, field study can be accomplished without serious difficulty by short excursions into the country. Such work is strongly recommended. The interest attaching to such trips will frequently enable the teacher to place them in afternoons and holidays. Field work has been undertaken with favorable results in Buffalo, Chicago and elsewhere. report of the Chicago committee for preparing a syllabus in physical geography includes a valuable list of such possible trips for the use of the teachers of the city. Eleven excursions are scheduled, giving route, cost of round trip and naming the phenomena to be seen and studied. The latter include stone quarries, streams, boulders and glacial topography, sand dunes, lake shores and a large museum. Preparation of similar guides for other cities would greatly advance this kind of geographic study. Chicago is not an exception. An equally important group of facts is assembled in the vicinity of nearly all cities.

Laboratory work in geography is comparatively new to the schools at large, and hence suitable manuals or outlines are few; but sufficient bodies of suggestion are at hand for good beginnings. One member of the committee has contributed the following, which is here included, not as a specific guide, but by way of informal suggestion: Figures in brackets indicate the number of hours for each exercise.

Cause of day and night and extent of sunlight over surface. (1)

Determination of latitude, north and south line and high noon. (1)

Determination of difference of longitude by sending watch. (1)

Finding variation of local and standard time. (1)

Making maps on different projections. (4)

Study of ocean current maps. (1)

Study of tide charts. (1)

Study of map of the world showing heights of land and depths of sea. (2)

Difference in temperature between the top and bottom of a hill. (1)

Finding height of hill or building by barometer. (1)

Determination of dew point. (1)

Making isotherm and isobar maps from furnished data. (4)

Study and reproduction of weather map. (1)

Predictions from weather maps (written with reasons). (2)

Observations of rainfall, temperature, velocity of the winds, etc.

Determination of the amount of snow-fall and the amount of water produced by an inch of snow. (1)

Observations of ground temperatures, depth of frost, etc.

Making contour and hachure maps from small models. (2)

Drawing cross sections from contour maps. (4)

Written descriptions of models. (4

Picture reading (written description). (4)

Map reading (written description). (4)

Reproduction of contour map in hachures. (1)

Making map of small area in neighborhood. (1)

Trip or journey planning with study of country to be seen. (4)
Determination of the amount of sediment carried by a stream. (1)

Study of rocks and minerals. (10)

Study of erosion by sprinkling pot. (2) In fall, four excursions, one a week. (8) Four excursions in spring. (8)

For another laboratory outline which has been tested by actual experience, see "Laboratory Work in Elementary Physical Geography," by R. H. Cornish, JOURNAL OF SCHOOL GEOGRAPHY, June and September, 1897.

VIII.

There cannot be a uniform or standard equipment of apparatus for geographical teaching. It is sought here only to give such suggestions as may enable teachers and schools to acquire, without serious mistake or delay, materials for effective work. Maps and photographs will naturally predominate, and slides and projecting apparatus should be added if possible, with the more common meteorological instruments. Care should be taken to secure illustrations well related to the systematic progress of the work. example, under land forms the illustrations introduced should be chiefly directed to explaining their causes and consequences, rather than to the production of striking pictorial effects. about one hundred classified lantern slides selected by W. M. Davis, chiefly from the Gardner collection of geological and geographical photographs of Harvard University, can be purchased from E. E. Howell, Washington, D. C. Some of the more important materials, such as the topographic maps of the United States Geological Survey, cost but little, and much material may be had free of cost from official surveys, or as gifts from individuals interested in the school. Some account of these and other official maps may be found in "Governmental Maps for Use in Schools," published by Henry Holt & Co., New York.* Models serve a useful purpose if their vertical scale is not too much exaggerated. Among those that may be mentioned are a number made by E. E. Howell, Washington, D. C., and the Harvard Geographical Models, published by Ginn & Co., of Boston.

*Since the publication of this book the free distribution of the pilot charts of the North Atlantic issued by the United States Hydrographic Office, and of the topographical maps published by the United States Geological Survey, has been suspended. The charts and maps are now sold at a very low price by the respective bureaus of publication. The method of purchasing the maps issued by the Geological Survey is explained in the JOURNAL OF SCHOOL GEOGRAPHY for September, 1897.

Suggestions concerning the use of these topographical maps in schools have recently been published by the departments of public instruction of Massachusetts, Rhode Island, Connecticut and New York. Similar publications would be useful in other states. An important publication of the United States Geological Survey has lately been begun in the Topographic Atlas of the United States, of which the first folio, entitled *Physiographic Types*, by Henry Gannett (price 25 cents), will be found of much practical service. Other folios of this series are promised for the future.

It is believed that school boards will in the end furnish appropriations for geography as freely as for physics or chemistry, if the needs of geography are duly appreciated by superintendents, principals and science teachers. Abundant allowance of time should be given to secondary teachers of geography, to perfect their equipment and to work out the new problems with which they have to deal.

By way of further suggestion, the teacher is referred to an article on the "Equipment of a Geographical Laboratory," by W. M. Davis, in the JOURNAL OF SCHOOL GEOGRAPHY for May, 1898. The following list also indicates an equipment found practically useful by one member of the committee: Good globe, small globes (25 cents), one for each two pupils, plumbobs, vertical standards for the determination of latitude, Kiepert's Physikalische Wanderkarten (Europe, Asia, North America, South America), Weltkarte zur ubericht der Meerestiefen & Hohenschichten, small compasses, bright, thin metal dishes for the determination of dew point, blank weather maps, coördinate paper, thermometer, barometer, rain gauge, tide charts, ocean current maps (copies from Challenger Expedition), small wooden balls, small outline maps, sprinkling pots and boxes, a few typical charts, geological maps, United States contour maps, sufficient duplicates of some sheets to give one to each pupil, Harvard geographical models, fragments of models for contour drawing, maps of different projections, a few English hachure maps, photographs and pictures, stereopticon and views, several atlases, collection of rock and mineral specimens, enough for each pupil, if possible.

For illustration of the structures and processes concerned in the development of land forms, there should be specimens of the com-

mon rock forming minerals, and of such rocks and structures as are important in determining topographic forms, or have economic value. Thus there should be sandstones, conglomerates, shales and limestones, lavas, specimens showing faults on a small scale, slickensides, crumpled laminations, ripple marks, raindrop impressions and sun-cracks, glacial boulders and glaciated surfaces, stalactites and stalagmites. If an advanced course in geology is given, the amount of such material as has been indicated above should be materially increased and some fossils should be added. In all cases care should be taken to avoid such jumbles of miscellaneous minerals and fossils as often make up collections so-called.

IX.

An annotated list of text and reference books has been prepared by Miss Mary I. Platt, recently of Radcliffe College, now teacher of geography, High School, Holyoke, Mass. The list, including fifty titles, has been examined and criticised by W. M. Davis and R. E. Dodge, and is published in the JOURNAL OF SCHOOL GEOGRAPHY for May, 1898. This list is by no means intended to be exhaustive of useful books, but outlines a useful beginning of a school library which might to advantage be greatly increased. It is further suggested that the JOURNAL OF SCHOOL GEOGRAPHY is the most important help with which teachers of the subject in the grades and high schools can provide themselves.

X. Preparation of the Teacher.

It is not to be expected that notable success in this or any other subject will be attained if attention is so far turned to the outline of the course or the equipment of the schoolroom, that the preparation of the teacher is forgotten. The committee, therefore, wish to emphasize three points that are of prime importance in this connection. The training of the teacher should have reached a distinctly higher grade in physical geography than that of the course to be given. It should include laboratory courses in Physics, Chemistry, Botany, Zoölogy and Geology, and it should have developed ability to take advantage of the local phenomena in the neighborhood of the school in the conduct of field work. These considerations should weigh in the selection of new teachers. Teachers already employed and

of good experience in their work should be urged to supplement their preparation, if deficient in any of the lines above indicated, by attending serious courses in teachers classes and summer schools, as far as practicable with due regard to rest and health.

A primary object of this report has been to attempt a rational definition of physical geography and to offer to teachers and school authorities a line of suggestion in organizing geographic instruction, especially to secure a sound elementary course in the early years of the high school. Minute and specific directions are undesirable, because a great variety of conditions must be met and the new must be built upon the old. A further object here sought is to set forth practicable views of the coördination of geography with the other sciences in the high school curriculum, and of geography as a factor in satisfying college admission requirements. The results of course are tentative. It is not thought that this committee and the other committees with which it is associated, can formulate a rigid or final plan for all schools, but an approximation toward unity can be made, with advance upon the chaotic conditions of secondary science instruction in the past.

The Committee would be glad to be continued for another year, in order that, profiting by the discussions of their conference already held, and by such criticisms as the publication of the present report may evoke, they may embody the results of further consideration in a subsequent report.

ALBERT PERRY BRIGHAM, COLLIER COBB, W. M. DAVIS, WILLIAM NORTH RICE, W. H. SNYDER.

THE EXPLORATION OF THE ALPS.

Let us take up one of the modern maps of the Alps on which altitudes are indicated by contours. Put a white wash over all the ground that lies above 8,000 feet and shades of green over the lower country. We shall find a series of snowy islands, fragments of an Arctic clime, extending in a great horseshoe from Nice to Trieste round the upper end of Italy, and separated from

one another by narrow green straits—the historical Alpine passes. As on an ocean where ships pass to and fro on certain narrow lines without halting or turning aside to explore the islands that rise for a few hours on the mariners' view, so for centuries in the Alps the companies of merchants or pilgrims, the armies of Northern invaders or of Holy Roman Emperors went backwards and forwards over the Great Passes, the Mont Cenis and the Brenner; while the Mont Genèvre and the two St. Bernards, the Simplon, the Spliigen, the Grisons Passes and the St. Gotthard were more or less in common use. But of what lay between these lines of ancient traffic the educated world and its cartographers knew little or nothing. A vague smear south of the Lake of Geneva entitled "Les Glacières" was the only indication of Mt. Blanc in their atlases. "A hill called Cursed," a close translation of 'Les Monts Maudits' is the first allusion to it in English literature, and that is due to a bishop—Bishop Burnet, 1686.

In the sixteenth century two men in the very front rank of science and art were attracted to the unknown region of the High Alps. In the case of the first, Leonardo da Vinci, the attraction was part of the universal curiosity of one who in the old phrase was as much a "natural philosopher" as an artist. "Strange things" were his delight. We learn from his Journals * that he wandered up among the great rocks and waterfalls behind the Lake of Como, but his principal Alpine expedition was to a Mons Bosus where he observed the granular structure of the snow, the atmospheric conditions, and other matters. The name was long a puzzle to German commentators, but it has now been certainly identified as the great spur which juts out from Monte Rosa and separates the Val Sesia from Gressoney. The existence of marble quarries in the vicinity may have brought Leonardo to this region, where Varello became by virtue of its famous shrine at a very early date a center of artistic work.

The second name we have to mention is one very familiar to botanists and even to flower-lovers—that of Conrad Gesner, of Zürich (1516–1565). After the manner of that age, at once a humanist and a man of science, compiling dictionaries and herbals, he left behind him a European reputation. His account of his

^{*}See the literary works of L. da Vinci, by Dr. J. P. Richter.

ascent of Mount Pilatus, written in Latin, has often been quoted, and deserves to be edited and translated. It is the first description, unless we go back to a dialogue in Lucian, of the pleasures of an Alpine expedition. The writer shows that he thoroughly enjoys the fun of the thing, the night in the chalet quite in the spirit of a modern Alpine Clubman, as well as the exercise and the view, and he pours contempt on those who do not share his enthusiasm.

But the instances here cited were men before their time; they left no immediate followers, they started no school of mountain explorers. The exploration of the high Alps began with the excitement caused in scientific circles by the discovery of the glaciers. That the mountain tops should freeze was thought natural enough. But that masses of ice should be formed in a valley at mid-summer between hay meadows and cornfields this was rarum sane Naturae Miraculum—a strange miracle of nature for our ancestors. It was indeed something that demanded attention, worthy to be ranked with geysers and volcanoes and petrifying springs!

The discovery might have been made sooner, but for the chance that the main Alpine roads do not as a rule approach closely to low-lying glaciers. Perhaps the only exception is that of the Bernina Pass, the Stelvio Road of course is comparatively modern, which runs within a stone's throw of the snout of the Morteratsch glacier, and should, one would have thought, have attracted the notice of Benvenuto Cellini when he passed through the Grisons.

It was, therefore, not by intelligent travellers, but by Swiss savants that these phenomena were brought into notoriety and the first specimens to be noticed were the glaciers of Grindelwald in Canton Bern, which next to those of Chamonix descend to the lowest level of any on the Alps (circa 3,500 feet).

In 1688 the first picture of the lower Grindelwald glacier was published in Merian's *Helvétia*. The first quarter of the eighteenth century was the period of the early accounts of the glaciers of the Alps. The authors of the time had, as I have said elsewhere, "a creditable enthusiasm for natural science and at the same time a childlike facility in swallowing wonders or accepting to our minds most ludicrous explanations as adequate solutions of the problems presented to them by the glacier region." Thus glacier ice was

supposed to be an intermediate substance between common ice and crystals, crystals such as are found about the St. Gotthard, being ice with all the water squeezed out of them! One of our countrymen, however, had the wit to inquire how the crystals found in tropical countries were to be accounted for!

The only glacier literature, besides a mass of pamphlets, comprised two works which still are not rare and in their day had a European reputation.

Scheuchzer's "Journeys in the Alps," A. D. 1723, is a delightful witness to the fact that the credulity of an age extends beyond its religion. The work was nominally scientific, that is to say it pretended to put before its readers ordered facts regarding the high Alps. Many such facts were recorded, but unfortunately they were accompanied by the most astounding tales as to dragons seen by trustworthy householders. These dragons were of novel species, flying dragons, fiery dragons and what not, which were duly distinguished by the veracious author. Not content with description he pictured these monsters in plates, the funds for which were obtained from the Fellows of Oxford and Cambridge colleges, and to crown all the volumes appeared with the imprimateur of Sir Isaac Newton and the Royal Society. In the transactions of the Society several short notices of the Grindelwald glaciers from Swiss correspondents may be found.

Some years elapsed before the next general work on glaciers appeared (1760). Gruner's Glaciers reflected the change in the spirit of the times. The age of miracles has passed and a rational spirit prevails. It is a fairly comprehensive and matter of fact account of the glaciers of the Central Alps, including those of the Bernina and the Rheinwaldhorn.

In the interval between Scheuchzer's and Gruner's publications the English traveller had appeared on the scene, and Pocorke and Windham, in 1741, had brought into notice the glaciers of Savoy, though the name of Mt. Blanc was not yet mentioned. It was their edition and Gruner's book which fired a Genevese youth who was born about the same date, Horace Benedict De Saussure, to take up seriously the task of mountain research. His conquest of Mt. Blanc in 1787, his week's residence on the Col du Géant, were feats to rouse the interest of Europe. They mark the begin-

ning of the scientific study of the high Alps, a study interrupted for a time by the French Revolution, carried on in our own century first by a group of Swiss savants, Agassiz, Desor, Studer, Dolfuss, Ausset and others, then by British men of science, such as Forbes, Ball and Tyndall, and finally by the whole army of the Alpine Club.

The development of Alpine knowledge and Alpine craft in the last half century, recently chronicled in the new edition of Mr. Ball's Alpine Guide, would be too large a subject for the end of a brief note.

That work, when completed, will be the record—in a topographical sense perhaps the final record—of the complete exploration of the snowy islands of our temperate zone, of the conquest, not bloodless, indeed, but made at comparatively little cost of human life, of a territory which serves the highest uses, which provides refreshment both for the bodies and souls of mankind, giving new health and happiness to thousands. Of the spirit that inspired the explorers an American poet was the truest exponent. It was in the works of Emerson that Tyndall found most of the mottoes that head the chapters which describe his Swiss adventures and researches.

Douglas W. Freshfield.

LONDON.

(To be continued.)

NOTES.

Highlands.—The sometime way in which courses of study here and there provide for the teaching of the highlands of the earth may be both logical and psychological, but when viewed from the standpoint of nature the "method" is not always supported by the facts of the case.

Quite frequently we begin: "A hill is an elevation of land." "A mountain is an elevation higher than a hill." "A mountain range is a line of mountain peaks," etc. Such a scheme has a charming simplicity about it; it is logical, because systematic in the order of presentation; it is psychological, because the pupil proceeds from the known, step by step, to the unknown.

The only trouble about the development of the subject is the fact that no such mountains exist in nature. Hills and mountains have each the quality of elevation, it is true, but the mountain is something more than a high hill. Isolated mountains, moreover, are of rare occurrence, and whenever they occur they are very apt to be volcanic cones or domes, neither of which is a good type of structure with which to begin the study of mountains.

The range, and not the peak, is the unit of structure, and the essential feature about it is the fact that it is a wrinkle or fold of the earth's rock-layers. In fitting themselves about a more rapidly shrinking interior the layers of the earth—the part we commonly call the "crust"—must of necessity wrinkle, cockle and crumple in order to adapt themselves to it. In other words, misfits and wrinkles go always together, no matter whether in tailor-made garments or in the evolution of the earth.

But a range is always much worn—weathered, we may say. From the very moment the fold begins to be formed, the waters of the atmosphere set to work to wear it down to base level. The top layers or strata are broken and worn away, leaving long ridges. Thus, the Appalachian ranges consist of comparatively few folds, but the latter have been crowded into very many ridges. The crests of ridges are often very unequally worn, and the higher parts form mountain peaks. The intermontane troughs are the valleys: the transverse notches, passes, cañons and water gaps. Very frequently a short range is called a mountain, and so also is a plateau of no considerable area.

In a few instances softer rocks may be worn away, leaving a boss of harder material in the form of a mountain peak. Mount Holyoke and Mount Tom are examples. Pocono, Broad and Broad Top, in the Appalachian ranges, are practically plateaus. Finistaarhorn, Matterhorn and Wetterhorn are each what the latter part of the name suggests—a "horn" or pinnacle of hard rock projecting above the main ridge.

Here are a few questions: Does the expression "everlasting hills" convey truth or falsity? Why is the floor of an intermontane valley usually flat and comparatively level? Why is the landscape of the Appalachian mountains generally rounded and graceful, while that of the Rocky Mountains is almost always

harsh and angular? How does a high range between two peoples affect their intercommunication? How have Khyber Pass, Mohawk Gap and St. Gotthard Pass affected history? How are canons formed? In what way have the slopes of the Rocky Mountains changed the contour of Mexico?—J. W. Redway in Ohio Ed. Monthly, April, 1898.

Explorations in the Interior of Western Australia.—That a large part of the interior of Australia is desert has long been known, but detailed knowledge of the region has been scanty. Occasional exploring parties have penetrated varying distances into the interior, or have crossed parts of the terra incognita, generally at the cost of great hardship and suffering. One of the most recent expeditions into the interior was that of David W. Carnegie, who, in 1896, with four others, crossed from the Coolgardie goldfield, near the southwest coast, to the Kimberley goldfields, in the north. Including the return journey, they traveled about 3,000 miles, nearly half of that distance through unexplored country. The greater part of the vast interior of the country was found to be desert, useless to man or beast. miles and miles there stretched a wilderness of high spinifex-clad ridges of red sand, so close together that from seventy to ninety were crossed in a day's journey of eight hours (12-13 miles). They were often so steep that the camels had great difficulty in Their average vertical height from trough to surmounting them. crest was 50 to 60 feet, and since they kept with great regularity a course from northeast to southwest, or even from east to west, the travellers in their northerly course were always crossing the grain of the country. These troughs and waves seemed to be corrugations in the surface of greater undulations, for during a half day's or a whole day's march, on reaching the top of one ridge a higher one was found in front, and, similarly, the next part of the journey would be over gradually descending ridges. appearance of the sand was only intensified by the few sickly, shrunken gum-trees dotted over it, together with the omnipresent spinifex. This scanty vegetation serves to bind the sand together in some small degree and prevent its blowing, although it can hardly be doubted from the author's description that the sand

ridges are dunes formed by the wind. The underlying rock is sandstone, which on disintegration has furnished abundant material for the winds to work upon.

All through this desolate country there live small families of natives (eight or nine together), who are, strange to say, by no means small or ill-made, but of good stature. They subsist upon spinifex-rats, snakes, lizards, iguanas, grubs, seeds and an occasional dove or pigeon. In order to secure their game they set fire to a small patch of spinifex and, surrounding the blaze, they knock over, with throwing sticks and spears, the rats or other animals or reptiles as they try to escape. Water is obtained from native wells, which yield a scanty supply. The wells are simply rock-holes, more or less partially filled with sand in which the water collects from the scanty showers which occasionally visit this region.

Wounds and scars from burning are of common occurrence, as the natives sleep very close to their small fires, and the babies and children are carelessly thrown down close to a fire and left to roll in and have an arm half charred, or be merely blistered and roasted, as chance may direct. In fact, a litter of pups receives more care from the women of the tribe than do the children, and seem to be valued more highly. That more or less trading goes on between the natives was shown by the fact that far in the interior the explorers found such things as pearl oyster-shells, lids of tin match-boxes, an iron tent peg, a piece of a saddle tree, a piece of glass and pieces of old wagon tire, all cherished either as articles of personal adornment or of great value. Since seventy or eighty miles is the very longest distance that any native can travel without leaving his own particular district and dialect, the extent to which the trade has been carried is remarkable.—Extracted from Scottish Geographical Magazine, March, 1898. H. B. K.

Salt Wells of China.—The most interesting industry of China is the salt wells. It is the industry that evidences more clearly than any other Chinese ingenuity. The building of the great wall required little engineering skill and the great canal is only the connecting link between the natural waterways of China, both proof of industry rather than ingenuity; but the ingenuity which,

seventeen hundred years ago, bored through solid rock to the depth of from 2,000 to 5,000 feet, attests scientific skill that may still interest.

NOTES.

The salt wells of China are found in Süchwan, Yunnan and Shansi; but the more important are near the city of Tze-lin-tsing, in the province of Szechuen, about 175 miles west of Chungking and an equal distance southeast of Chengtu. The salt belt is a triangular tract, having the Min river from Chin-tong-fu to its junction with the Yangtze at Sui-fu for its base and its apex near Tze-lin-tsing, an area of some 1,500 miles. The number of wells in this region, officially reported, is twelve hundred, though by some estimated as high as five thousand. They average about six inches in diameter and vary in depth from 700 to 5,000 feet, though there is one reported to be 5,900 feet deep. (?)

The boring is by means of a wrought-iron rod about fourteen feet in length, with a steel edge which forms the chisel for drilling, and other rods are joined by bamboo fastenings as the depth increases, the whole being worked up and down by a lever raised by a number of men jumping on one end and lowered by being set free, the process being aided by a counterbalancing weight attached to the other arm of the lever, which is increased as the rods are increased in number. As the rod is raised and lowered it is turned first one way and then the other by a man placed in charge of it. In this manner it generally requires from thirty to forty years to bore a well of medium depth, but, as time is of little value in China, where a common proverb says, "slow work produces the finest goods," and, as wells are usually the property of families, it is of little consequence whether this generation or the next secures the benefit of their output, and one well is known to have been in the possession of the same family for five or six hundred years. When the boring begins it is not known whether salt or gas will be struck, but, as both are equally valuable, it is a matter of no consequence. The brine is lifted from the wells in long bamboo tubes or buckets with a leather valve in the bottom, and this is drawn up by a bamboo rope which passes over a pulley fixed in the top of a lofty derrick from 60 to 170 feet in height. The rope wears out rapidly and must be replaced about once in ten days. The bamboo bucket is not more than three inches in

diameter, but may be 60 or 100 feet in length, proportioned to the height of the derrick, and thus some 200 catties (266 pounds) of brine is brought up at each turn. The rope passes down from the pulley and under another wheel fixed but a few feet above the ground and thence into a shed, where it is wound around a large drum turned by three or four water buffaloes. It takes from fifteen to twenty minutes to draw up a bucket from the deeper wells, and when it is swung up under the derrick a workman pushes an iron rod into the bottom and lifts the valve, allowing the brine to escape into a tube, whence it flows into a large reservoir which is kept under lock and key.

The brine is not all of equal value. The deeper the well the stronger the brine. The best has a blackish, dirty appearance, and both the gas and brine wells give off a very disagreeable odor, due, perhaps, to the presence of carbonated hydrogen gas.

The buffaloes cost from \$20 to \$30 (Mexican) each, and are kept in excellent condition. They are allowed a respite after drawing up two loads, and each animal is used four or five times during the twenty-four hours; but they do not long endure the strain, and few last longer than five years, some not longer than one year. This is owing to the fact that they are slow beasts and cannot accustom themselves to the rapid gallop at which they are driven while drawing up the brine.

From the reservoir the brine is conducted in bamboo pipes to the evaporating sheds. It flows first into casks, whence, by smaller pipes, it is conducted to the pans. The pans are quite shallow and measure from 4 to 6 feet in diameter and weigh as much as 1,600 pounds. These are not generally the property of the salt factories, but are leased from the manufacturers at from 30 to 40 taels per annum; and for this price the contractor guarantees a good price for the salt throughout the year, thus necessitating the exchange of pans about once every two weeks, or so soon as they are burned out, the salt factories paying the cost of returning the old pans to the manufacturer. The pans are made in Kiang Tsing, a city on the Yangtze-Kiang, not far from Chungking, which seems to be the nearest point at which iron can be obtained, and are conveyed by water to within a short distance of the wells. Each pan is swung from a heavy beam requiring the strength of sixteen men to carry it from boat to boat.

The gas wells are not so numerous as the brine wells, nor do they usually belong to the same proprietors as the latter. Some maintain that the product is petroleum gas; others that it is the production of the brine wells; that when they are first opened the gas rushes out with tremendous force and must be consumed before the wells can be worked for salt. The gas is in great demand for use as fuel and is sold to the salt evaporators at the rate of 40 to 50 taels per jet per annum.

A number of pipes lead from the top of each well to the furnaces and are divided and subdivided to reduce the pressure, the ordinary jet being about half an inch in diameter. Other jets are used to illuminate the evaporating sheds, as the work goes on night and day; but it appears that it has never occurred to the authorities to utilize the gas in lighting the city.

The salt is of two kinds—pan or lump salt and granular. The former has the shape of the pan; the latter has bean flour added to it to increase its whiteness. There are about forty districts in Süchwan in which salt is manufactured; but the annual production of that province is difficult to determine and estimates vary considerably, though it is not less than 300,000,000 pounds. The sale of salt in China is a Government monopoly. From the one province of Szechuen alone a revenue of 3,000,000 taels or \$2,400,000 in gold is obtained. The price of salt at the wells is about 1½ cents in gold per pound; but to this must be added the Government tax, which at the wells is half a cent per pound, making a total of 2 cents. But the price increases with the distance from the wells, owing to the numerous likin stations, which must be passed, and a tax is levied at every station.

Well salt is also produced in Yunnan, Kansu and Shansi. In the eastern provinces it is obtained at a much cheaper rate by evaporation from sea water. On the coast of Chihli may be seen windmills, slowly revolving about a perpendicular axis, pumping water into vats.

The sale of the salt is regulated by licenses, and a license once issued is good forever. It is used year after year, and handed down from father to son, though it may be transferred to others if desired. A license sells for about 12,000 taels, or \$9,600 in gold.

The whole Empire is divided into seven circuits for purposes of

salt administration, and the source of supply for each circuit is strictly limited; and any salt coming in from other quarters is regarded as smuggled and is confiscated. The merchant who has a license may choose any market he pleases within his own circuit; but, once arrived there, he cannot sell an ounce of salt until his turn comes, which is fixed by the order of his application. Thus, he may wait many months before disposing of his goods, and is not likely to use his license more than once a year. The retail price of salt varies from about 2 cents per pound along the coast to 5 cents per pound in the interior.

The entire revenue derived from salt by the Chinese Government is estimated at 13,659,000 taels (\$10,927,000). Since the war with Japan the Government has increased the salt tax one-sixth of a cent per pound. The annual consumption for all China is estimated at over 3,300,000,000 pounds. The importation of foreign salt is altogether prohibited.

At one period salt was used as money in China. The salt was formed into cakes, which could not be prepared by any other than the officers of the Emperor, and the cakes so passable as money were impressed with his stamp. The cakes were valued at 2d. each, eighty cakes being equal in value to about the sixth part of an ounce, and, consequently, a cake of salt was in value the one hundred and eightieth part of an ounce of gold, which, at the price of £4 (\$19.47), is exactly 2d. (4 cents) for the price of each cake. Consular Reports, February, 1898.

Programmes and Examination Papers.—"Programmes reveal the intelligence of their compilers, but not the efficiency of those who follow them in teaching. A good teacher can succeed in obtaining excellent results from a poor syllabus, while an inefficient one may fail to educate even when he follows a well-planned course. Examination papers show the conceptions of geography held by the examiners, yet the teaching may be of a much better or much worse type than the nature of the examiner's questions would indicate."

A. J. H.

The Longest Day of the Year.—It is quite important, in speaking of the longest day of the year, to say what part of the world

we are talking about, as it will be seen by reading the following list, which tells the length of the longest day in different places. unfortunate are the children in Tornea, Finland, where Christmas day is less than three hours in length. At Stockholm, Sweden, the longest day is eighteen and one-half hours in length. Spitzbergen it is three and one-half months. At London, England, and Bremen, Prussia, the longest day has sixteen and one-half At Hamburg, in Germany, and Dantzic, in Prussia, the longest day has seventeen hours. At Wardbury, Norway, the longest day lasts from May 21 to July 22 without interruption. At St. Petersburg, Russia, and Tobolsk, Siberia, the longest day is nineteen hours and the shortest five hours. At Tornea, Finland, June 21st brings a day nearly twenty-two hours long, and Christmas less than three hours in length. At New York the longest day is about fifteen hours. At Montreal, Canada, it is sixteen.—The Christian Intelligencer.

Ethiopia.—The Geographical Society of Paris has inserted in their Comptes rendus (Nos. 4 and 5 of 1897) a note giving some statistical and economic information on Ethiopia. The interest lies in its semi official origin.

The population of the empire is fifteen million inhabitants, or thereabouts. This is a union of kingdoms and provinces from which the chiefs receive the investiture of the Negus. The same laws rule all the empire; the taxes are sent to the imperial administration. Commerce thrives; it consists of the exportation of coffee, gold, ivory, civet, skins, gums, wax, coloring and medicinal plants, above all the kosso, and the importation of tissues, arms, instruments, etc.

A postal service by meharis is established between the French port of Djibouti, the harbor of the boats of the Messageries maritimes, Harrar and the actual capital Addis-Ababa. The imperial residence, a suburb of the old capital, Antoto, has 50,000 inhabitants and a floating population of 30,000; Harrar, the great centre of commerce, has 42,000.

The monetary unit is the beur, with the effigy of Menelik, equal in weight and value to the old thalari of Marie Thérese.

Climate and Commerce.—The control of the severe winter cold of Russia and Siberia over the commerce of those countries is well

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known, the blockading of their great ports by ice during the winter being one of the serious drawbacks in the development of their import and export trade. But now the ingenuity of man comes into play, and by means of huge steam rams it is found possible to keep open many of the important harbors throughout the cold season. Vladivostok now has a steam ram which is effective in keeping open its harbor. In Finland the port of Hangö is also kept open by a steam ram, and Admiral Makzrof, of the Russian navy, thinks it perfectly feasible to maintain communication, through the winter, between the sea and the port of St. Petersburg. The struggles of man to overcome the difficulties which nature, through climate, puts in his way, are among the most interesting of his many activities.—Science, May 6, 1898.

India Rubber in Africa.—The development of this source of riches in equatorial Africa is remarkable.

At Lagos the exportation of India rubber in 1894 reached a value of 8,000 fcs. In 1895 it went up to 6,745,825 fcs. At Côte d'Or there was no exportation in 1882; in 1893 it amounted to five millions.

At the Belgian Congo the exportation to Antwerp was not five tons in 1889; it amounted to 531 tons in 1895, and to 1,116 tons in 1896.

It is an example to be followed by our African colonies situated in the same climatic zone.—Soc. de Geog. Com. du Havre.

Wheat in the Argentine Republic.—The wheat area of the Province of Buenos Aires is equal to half that of the United Kingdom of Great Britain. The development of this industry in what is known as the "Queen Province of Argentine" has been something remarkable. In 1881 the wheat area was 200,000 acres; in 1895 it had increased to 900,000 acres, since which time the extension of this cultivation has gone on with unhalting progress. In addition to wheat, an immense quantity of maize is raised, nearly 2,000,000 acres being covered by this product. The cattle and sheep industries are likewise of great magnitude—in 1895 there were 7,205,000 cattle, with 50,000,000 sheep and 1,080,000 horses.—Bull. Bureau of Am. Repubs., Nov., 1897.

REVIEWS.

North America: Stanford's Compendium of Geography, New Series; Vol. I., Canada and Newfoundland (1897), S. E. DAWSON; Vol. II., The United States (1898), HENRY GANNETT. London, Edward Stanford.

The two volumes mentioned above take the place of those noted on p. 185 of the May issue, in the series of volumes on the various continents now being issued in revised edition by Edward Stanford. Both volumes are, like the series as a whole, neat in typography and general appearance, pleasing to the eye and convenient in size and shape. They are welcome additions to the geographical literature of North America, being both written by competent hands and containing the most recent information. They deserve a very general use as reference books in both school and town libraries, for they fill a long felt want.

Volume I., dealing with Canada and Newfoundland, is the larger and more detailed of the two. After a general introduction, follow chapters considering the Dominion of Canada (as a whole), the history of Acadia, the Maritime Provinces, first as a whole and then each in detail. The same plan is followed in treating Old Canada or the St. Lawrence Provinces, Manitoba and the Northwest Territories and the other several divisions of the Dominion. The book closes with a chapter on the separate colony of Newfoundland.

The volume, as a whole, is interesting reading, but a little long, owing to much repetition and the introduction of considerable matter of an historic character that is hardly germane to the principal subject. One gains from the reading some new and pleasant ideas of Canada, and its resources, climate and enterprise. The general impression left is that Canada is over-supplied with all that is good, particularly in water power, soils, harbors and climate, and that the author at times has been over-liberal with his praise. To the many in the United States who have been accustomed to think of Canada as the cold and barren country to the north, some of the descriptions of geographical position and features will be valuable reading, for we are apt to be unjust in

REVIEWS. 277

our consideration, or lack of consideration, of our next neighbors.

The maps are usually good and sufficiently clear. They contain, however, many errors, particularly in spelling, which are usually, and fortunately, corrected in the text.

Volume II., on the United States, is smaller and more condensed than Volume I. It is, however, so condensed in places that the general treatment lacks continuity. A third of the book is given to a careful description of the Geographical Features, the Climate, Fauna and Flora, and the Geology and Mineral Resources. The remaining two-thirds is devoted to chapters on the Population, Social Conditions, The Great Cities, Indians and Their Remains, Extent and Area, History, Government, Agriculture, Manufactures, Transportation and Commerce, and Alaska.

The book is well supplied with maps, large and small, and is generally attractive. It will naturally replace "Whitney's United States" as a book of reference, except for a treatment of the larger geographical features, in which point Whitney's book seems to be more helpful to the general teacher.

The book abounds in recent, valuable and well selected statistics and will be found a mine of information to the general reader and teacher in this country and abroad. When so many good qualities are found in a much needed book, it is displeasing to find that which cannot command favorable criticism. There are, however, a few points that deserve mention.

The excellent and long-needed emphasis of the relation of the Rocky Mountains to the Cordillera, and of the use of these terms, is somewhat clouded in clearness by an unfortunate use of catch headings of paragraphs, whereby Rocky Mountains seem to include too much. In some other cases paragraph headings are a bit confusing. We regret to see the term Great Valley applied to the region usually denominated as Great Central or Central Valley, particularly as the Great Appalachian Valley is commonly known in the literature and in usage as the Great Valley.

There are some few errors of statement usually due apparently to a lack of cross reading, for the same fact is told differently in different places. Some statements in the descriptive matter do not agree with what is displayed on the maps or in the statistical tables, and on page 95 west instead of east causes a temporary con-

fusion. Many educators in this country will not accept as authentic the writer's comparison of the school systems in some of our larger cities, and some readers will be surprised to find that Greater New York was apparently inaugurated under a reform administration.

We miss a good treatment of the position of the United States in latitude and its relation to the general wind system, and regret the omission of certain points of great value to teachers, of which the Chinook winds may be given as an instance.

For the purposes of the general teacher and reader, the book is of great value, as the best consideration of our country as a whole available to all libraries. The book would have been vastly improved by the introduction of lists of references, such as are to be found in Volume I.

These two volumes are satisfactory companions to their predecessors in the series, which deal with Asia, Australasia and Africa. The series as a whole deserves much greater use in this country than it has at present, for it is the only series in the English language which is authentic, sufficiently inclusive and reasonable in price. Teachers in the common school will find each and every volume the very best book for information supplementary to their textbooks.

R. E. D.

Elementary Commercial Geography. By Dr. H. R. MILL. Pitt Press, Cambridge, Eng.

The fourth edition of Dr. H. R. Mill's "Elementary Commercial Geography" is a reprint of former editions, but revised throughout and as far as possible brought up to date. After some year's experience in using this geography in class teaching, we can unhesitatingly say that it seems to us the best of its kind: scientific, concise, and yet thorough. Its chief merit is that it does not say too much, but at the same time gives all the facts of real importance, and it can readily be supplemented by an experienced teacher with notes for more advanced students. As far as we can see, the revision of this edition has been carefully done, and the book is more up to date than most school geographies; but we have noticed several points that might with advantage receive attention in future editions. Thus on p. 74, in the trade of Liver-

pool, dead meat should be added as well as cattle, and the fruit trade is important enough for mention. On pp. 75-76 the growing importance of Southampton for the American liners is not sufficiently recognized, and on p. 77, rather a later date than 1892 might have been given for the figures of trade. In the West Indies Dominica (p. 106) now produces a very appreciable quantity of the total West Indian export of limes and lime-juice. On p. 111 we notice a curious error of grammar ("the placer mines on the Klondike River is attracting"); and, speaking of gold mines, we fancy that Kalgoorlie people would be surprised at not being mentioned on p. 95, if Coolgardie is inserted. The new railway to the goldfields in West Australia should also be mentioned. not see any mention of the North Sea and Baltic Canal on p. 136 (Germany), although it is referred to on p. 55. These and similar omissions will no doubt be rectified in later editions. The book as a whole is the most practical of its kind.

We cannot, however, speak quite so highly of the Atlas, which bears the date 1889, and is sadly in need of revision. The special maps of climates, diseases, population and products are very good; but the maps of the continents are too crowded to be really useful, and the red-ink names are very difficult to decipher. The adoption of a thin black line for a railway makes it difficult to distinguish between a railway and a river; while in South Africa we can see no traces of any railways at all. The United States railways also need revision, and in map 19, those of Great Britain (on a larger scale) might as well have the letters M. R., G. W. R., and others, printed along their course, as there is room for them. The Atlas is useful as a sort of pioneer attempt, but of course, it suffers greatly from being nearly ten years old, and we hope it may soon be possible to issue a new edition. H. DE B. G.

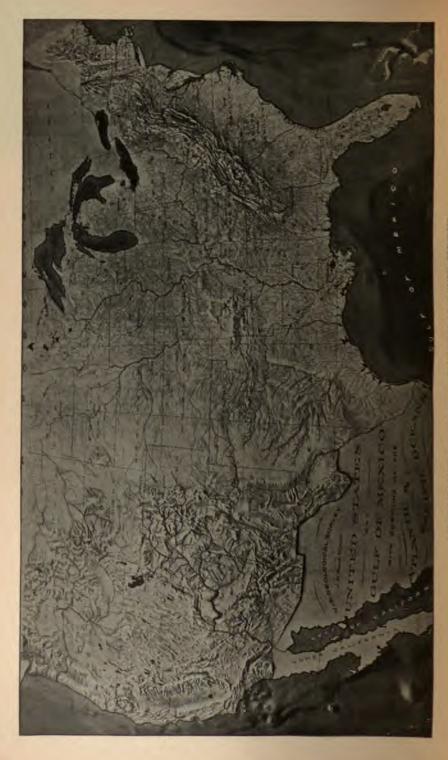
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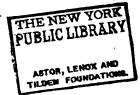
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THE UNITED STATES IN MELIEF, SHOWING THE PRINCIPAL PHYSICAL PROVINCES PROLOGRAPH FOR IN MADE IN HOUSE!

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ORIGIN OF THE PHYSICAL FEATURES OF THE UNITED STATES.*

Fifteen years ago, on a September morning, I stood on a housetop in Zuñi, waiting for the rising of the sun. On other housetops here and there were other watchers, sitting or standing with their faces toward the east, and close at my side stood a venerable priest of the Sun, oblivious of all else and gazing intently on the spot where the sun should appear. neck hung a small bag containing sacred meal. When the first streak of light appeared above the eastern mesa his lips began to move, and he repeated slowly and with a low voice an invocation to the Sun. Then, taking from the bag a small offering of the consecrated flour, he breathed upon it and cast it toward the east. Cushing, who became a Zuñi Indian that he might learn their lore, tells us that this sunrise-ritual contains archaic words of which few modern Zuñis know the meaning-words related to the modern Zuñi tongue as Norman French to modern English, and showing that the Zuni sun-worship began in remote times, far beyond the possibility of historical determination.

The Zuñi's reverence for the sun-god is shared by many savage tribes, and belongs to the early history of many civilized peoples.

^{*}Reprinted by permission from National Geographic Magazine, July, 1898.

In later stages of culture it is succeeded by the worship of animals, of the personified powers of nature, and of personified mental power, so that with civilized man the old sun-worship has disappeared; but there is a new sun-worship, introduced and fostered by science, for science has discovered in the sun a creator of wonderful versatility and power.

Geographers worship also another nature-god, the inner earth, or the underground, a creator also and co-worker with the sun. These two gods of physical geography were known to the Greeks as Helios and Hades, to the Romans as Apollo and Pluto. In later centuries Apollo, as the stimulator of life, developed into the god of culture; but to early tradition he is the sun, a nature-god coördinate with Pluto, the underground. Geology has long recognized Pluto, but has made him coördinate with the sea-god, Neptune, naming her rocks in two great groups, the plutonic and neptunian. Neptune has place also in the pantheon of geography, but only as a vassal of the mightier Apollo.

Apollo gives to the earth light, heat, frost, storm, and rivers, and is daily the creator of motion and life. Pluto is an unknown god, hidden and mysterious. The Greeks named him Hades, the His only attribute of which we are altogether sure is Imagination pictures him in various ways, but imaginations differ, and their conflicting sketches need not claim our attention to-day. He made the continent and is never tired of remaking But for him the globular earth would be envelopt in an endless ocean, and life would be far different from the life we know. By ridging the outer rind of the earth he created the land and set a limit to the sea, and from age to age he swells broad land tracts upwards or draws them downward, so that the outlines of sea and land are ever changing. Crushing the rock together here and there, he forces up mountain ridges; fusing it, he pours out lavas that congeal and build up other mountains.

Apollo dips up water from the sea and sprinkles it on the rock to moisten and soften it. By alternate heating and chilling he cracks it into bits; and by a complex chemistry which, despite our studies, still seem magical, he changes it to fine soil, in which plants may grow and in which the husbandman may delve. Lifting more water from the sea, he pours it broadly on the land to make

rills and rivers, which wash the soil away, spreading it in the hollows and building plains. This scouring cuts the uplands into hills, but eventually they, too, are worn down, so that the plain is the end and aim of the water work. Preparing for the plow the vielding soil and level surface which makes its labors light, and showering the fields with fertilizing moisture, he is the beneficent patron of agriculture.

The mountains of Pluto, lifted to the region of clouds, intercept and engender storms and are the perennial sources of streams. Rugged with gorges and crags and scantily clothed with soil, they extend no welcome to the farmer, but instead they harbor a forest growth, storing timber and fuel; and in some lands their huge banks of winter snow are reservoirs for the water of irrigation.

Pluto and Apollo separate the earth stuff into kinds. minerals of the land were mingled in one complex but homogeneous substance, the problem of civilization would be a problem of separation and would be chemical; but the gods have classified and arranged, sorting the more abundant materials into broad layers, and gathering the rarer into crevices and pockets; and so the problem of civilization is a problem of exploration and discovery, or a problem of geographic distribution.

Pluto sorts by creating a slow circulation of water. As far as mines and borings have penetrated the earth the pores of the rocks are full of water, and the downward limit of this saturation is un-The upper rocks are comparatively cool; the lower rocks are hot; and the contrast sets the water in motion. water, denser because cold, tends downward; the under water, expanded and made lighter by heat, is forced upward, and though motion is exceedingly slow, there is a continuous circulation. The chemistry of the upper water is different from the chemistry of the Each can dissolve certain substances, but the substances are not the same. The properties of water change as heat and pressure increase, and again as heat and pressure decrease. the slow-moving water picks up certain substances in one region and in another deposits them so as to receive other substances, and in this way it sorts out many of the rarer things, gathering together or concentrating ores of gold, silver, platinum, mercury, lead, zinc, copper and iron.

Apollo sorts by the free circulation of water at the surface. The soil that is washt away from mountains and uplands and spread by the streams in lowlands and submerged plains is not deposited in one promiscuous mass, but is classified according to kinds—marl in one place, clay in another, and sand in another—and in time these become limestone, shale and sandstone. The tissues of plants are gathered in swamps and changed to peat, then buried under shale and sandstone, and finally transformed to coal. The tissues of plants and animals, intimately mingled with mud that changes underground to shales, are slowly distilled in after ages to fill rock reservoirs with oil and gas. In other places and by other special processes iron, salt, gypsum and phosphates are separated; and where Plutonic stores of the metals are ravaged by storm and stream, the gold is separated by its weight and gathered in the river gravels.

The origin of the features of all lands having been thus briefly sketcht, we may now consider in a broad way the physical characters of the United States, and for this purpose it is convenient to divide the country into a few broad provinces.

Parallel to the Atlantic coast is the Appalachian Mountain belt, running northeastward from Alabama to New England. East of it lies the Atlantic plain. West of it the Central plain, consisting largely of the valley of the Mississippi, stretches to the base of the Rocky Mountains. Thence to the Pacific coast is a mountainous province known to geographers as the Cordilleras. A fifth province, the province of the Lakes, overlaps the northern portions of the other four and reaches from ocean to ocean along our Canadian border.

The Cordilleran province, comprising the western third of our country, is characterized by mountain ranges. The dominant trend is with the meridian, swerving in some districts toward the southeast, and in others toward the southwest; and in each district there is a general parallelism. The ranges are definitely Plutonic, each one having been caused by a distinct local uplift; but they are not altogether independent, for there is much evidence of system in their arrangement. Not only are neighboring ranges approximately parallel, but they are evenly spaced, so that in crossing the system one finds a regular alternation of ridge and valley.

Through extensive districts the alluvial waste from the erosion and sculpture of the ranges is gathered in the intervening valleys, making of each one a shallow basin or gently concave plain, where roads may run at will. Here and there some of the lower ranges are almost buried by the alluvial filling, so that their summits project as craggy islands above a sea of rock waste. Elsewhere, and especially where the mountains are highest, the intervening valleys are drained by vigorous rivers, which carry off the waste and prevent the building of extensive plains. In one important district uplift has not completed its work of mountain-making, and the land forms a system of plateaus of various heights, through which the Colorado and its tributaries have carved their wonderful system of canyons. Volcanoes, also, have made extensive contributions to the topography, building many great cones and a multitude of cratered hills, and adding voluminous beds of lava to the alluvial strata of the valleys.

In the extreme northwest the rainfall is exceptionally abundant, causing a forest growth so luxuriant and dense that the farmer cannot afford the labor of its subjugation as the purchase price to Nature for his land. Much of this district, also, is too rugged for the plow, so that it constitutes a great natural forest reserve, needing only protection from fire to insure a perpetual supply of timber. In the remainder of the province the rain tribute is scant, falling far short of the farmer's needs, so that crops must be irrigated. The downfall is greater on mountains than on valleys, and about their cool summits the winter's snow lingers through spring and summer, doling out water to mountain streams, which may be utilized for the irrigation of valley lands. But the acres which can thus be nourisht are only a small share of those whose smooth surface invites the plow, and the valleys as a whole belong to the herdsman rather than the husbandman. grasses are scant, but this fault is half compensated by their immense extent, and they must be counted as a valuable resource, an important reserve of grazing land that can never be monopolized by agriculture. On the higher plateaus and in the recesses of the mountains are tracts and patches of forests, many of which are protected against hasty consumption by inaccessibility, and these supplement the great reserve of the extreme northwest. In

the mountains, also, are Plutonic stores of the precious and other metals, and a score of valleys hold Apollonic magazines of coal. The mountain streams, in addition to their tribute to agriculture, afford power to the manufacturer. Untamed and fickle, subject to enormous floods and irregular droughts, their control is not easy; but if they shall ever be subdued and harnessed, there is hardly a limit to the tasks they may perform.

The Central Plain, comprising half of all the land, has been shaped by Apollonic forces. The geologist tells us of many uplifts, dislocations and flexures of the crust; but all these have been reduced to approximate evenness by the coöperative work of rain, frost and rivers. Where hollows were made they have been filled; where hills and mountains had grown they have been pared away, so that only their roots, with a few low stumps, remain. In types of detail there is much variety, and there are many rugged tracts; but the characterizing feature is evenness, and agriculture is the great industry for which the province is naturally destined.

On this broad fact, however, climate imposes an important qualification. Over most of the province the spring and summer rains suffice for the farmer's need, disappointing him only by an occasional drought, but in a western belt following the base of the Rocky Mountains, and including much of the sub-province known as the Great Plains, the rainfall is so scant that agriculture must depend on irrigation, just as in the Cordilleras. Here, again, grazing may flourish without need to compete with agriculture for possession of the land, and the domain of the herdsman is thus naturally set apart.

Of the rarer mineral resources the Central Plain has greatest wealth in coal, which underlies broad tracts and is easily mined. It is rich also in iron, both Plutonic and Apollonic, and has abundant salt and gypsum. Throughout its broad extent wagon roads and railroads are easily constructed, and its grain for export finds cheap water transportation from interior districts to the sea by way of the Mississippi and the St. Lawrence.

The mountains of the Appalachian Province were formed by the coöperation of Pluto and Apollo. Long ago the crustal rocks were crowded together in a great system of wrinkles, the crests of which were then wholly pared away so that the Central and

Atlantic plains were joined in one. Then came other disturbances along the folded belt, but without new folding. The plain The plain LENOX AND locally lifted into a long plateau, with gentle slopes on either side. and from this plateau the mountains have been carved. the remnants of the old truncated folds ran long outcrops of various and diverse rocks, trending northeast and southwest, and these rocks have been wasted unequally by the eroding waters. Where there were soluble limestones or weak shales, the streams opened valleys; where there were resistant sandstones or quartzites, mountain ridges were left; and so the Appalachian ranges are a complex cameo of Nature's carving. The broader valleys were smoothed in the carving and prepared for agriculture, the mountains left rough and reserved for forest. The region is rich in iron, both Apollonic and Plutonic, and peculiarly rich in what may be called Plutonic coal-coal made, indeed, by Apollonic processes, but converted to rich anthracite by Plutonic heat. Water power is abundant, and though less magnificent in its possibilities than the power associated with the loftier Cordilleras, of greater present value because more tractable, and because associated with tillable plains that are qualified by climate for the primary industry of agriculture.

The Atlantic plain resembles the Central in that both cutting and filling have contributed to its formation, but the constructive factor is here more important. While the Appalachian folds were being reduced, part of the waste went eastward, burying the Atlantic margin of the continent and extending it seaward. Later, when the Appalachian cameo was carved, the accumulation of waste was continued, and so the eastern part of the Atlantic belt is what geographers call a constructional plain. But there is another part, lying close to the mountains, which shared in the Appalachian uplift and also in the Appalachian carving, and was finally reduced so nearly to sea level that it constitutes an inseparable part of the Atlantic Province. It consists of ancient rocks, graded down nearly to a uniform level, and is classed by geographers as a destructional or eroded plain. As Pluto raises and lowers the land the ocean is caused to alternately recede and advance, and this low-lying plain is peculiarly susceptible to its encroachment. In our day the fourth part of it is submerged, so that its actual limit as a physical

feature lies many miles beyond the coast, where there is an abrupt change from shallow soundings to abyssal depths. The land of the Atlantic Plain is shaped for agriculture, and much of it is cultivated; but there are broad tracts of soil too poor to compete with the fertile land of the Central Plain and utilized only for timber and other forest products. Water powers, afforded by the moderate fall of large streams, have great value by reason of their proximity to tide water and consequent facilities for cheap transportation of the raw materials and the products of manufacture.

The Lake Province, overlapping all other provinces from the north, is a marginal overflow of Canadian topography, and resulted from the great prehistoric invasion of our land by Canadian The colossal ice-sheets of the eastern and central British provinces and the contemporary glaciers of the northern Cordilleran mountains remodeled the topography of all the provinces, carving the valleys into new shapes and heaping the débris in irregular mounds and ridges of peculiar type. When the ice was melted and rains fell again upon the land, the streams could neither find nor follow their old courses, and the waters were compelled to fill many a hollow before they could flow away at all; so while the old types of mountains and plains remained as broad features characterizing the several provinces, there was added the feature of obstructed drainage, markt by a multiplicity of lakes. Of these are the lakes and ponds of New England and New York, the great Laurentian lakes and their host of associated lakelets, the mountain lakes of Idaho and Montana, and the curious linear lakes of northern Washington. The distribution of ores was not affected. though facility of discovery and exploitation was locally modified, being partly impaired and partly improved. The surface conditions bearing on agriculture were greatly changed. Large tracts denuded of soil were relegated to the growth of timber; others were made hilly by the heaping of drift, and yet others were smoothed by sedimentation in the beds of temporary lakes. new soils have a special quality as compared to those resulting from the decay of rocks, for rock decay involves leaching and the loss of soluble minerals. The ice-mill ground together unleacht samples of many rocks and deposited them with little sorting, so that the glacial soils are often rich in materials which elsewhere need to be artificially supplied.

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THE SOUTHERN PART OF THE PREMIETONIC CANADIAN ICE-SHEET. A DARK TINT SHOWS THE EXTENT AT AN EARLY STAGE. THE LIGHT TINT SHOWS A LATER STAGE, OF CHEATER IMPORTANCE IN MODIFYING GEOGRAPHIC DETAILS

Photograph from a model. The placial data are on the authority of P. C. Chambertta

The confusion of drainage has yielded results as important in their way as those from the traditionary confusion of tongues at Babel, for the disconcerted streams, having their descent arrested by basins and lakes, are compelled elsewhere to tumble down rapidly, making convenient water powers; and these water powers have special value because the associated lakes are natural reservoirs, protecting them from flood and drought. As the greater lakes are also natural avenues for commerce, the province of the lakes, associating water power with commercial facility, is the natural home of manufacture.

The physical characters which, after mineral resources and climate, have greatest influence on industrial activities are internal routes for commerce and maritime harbors in their relation to external routes. The lines followed by pioneer settlement as well as those to which internal transportation ultimately adjusts itself are greatly influenced by topographic configuration, continuous mountain ranges acting as barriers and low passes through ranges serving as avenues. Long lines of navigable water also have their influence, and for districts whose most practical product is so abundant as to yield a surplus for exportation, facility of transportation means progress in population and wealth. The consideration of these conditions is attractive, but as they affect various localities unequally their discussion may properly be left for the lecturers who are to speak of more limited districts.

Harbors, however, though their local quality has local value, are of primary importance to the country as a whole and may be considered to-day. They are naturally formed in many ways, but only the principal types need be mentioned. Wherever a river reaches the sea the continuous contour of the coast is broken, and there would be a natural harbor but for the opposition of the waves. The outflowing river endeavors to scour a channel through which ships may enter. The waves, buffeting the coast and drifting sand and gravel to and fro, endeavor to clog the riverway with submerged bars, making the water too shoal for shipping. Over small rivers the waves are victorious, and unless engineers cooperate with the rivers the entrance-ways are sealed. Large rivers overpower the waves and clear their channels faster than the waves can clog them. Only one of our rivers, the Mississippi, has proved

competent to maintain its channel to the sea, but that affords a harbor of peculiar value, in that it is connected with a system of inland navigation hundreds of miles in extent.

The fiord harbors associated with prehistoric ice-fields are an important group. The ice descended to the shores of both oceans, and by its remodeling of the surface left steep slopes with a tortous contour, creating a great abundance of deep harbors. New England at the east and Washington at the west are thus endowed, and their maritime commerce requires neither piers nor dredges to maintain its natural channels.

Natural harbors of a third class are connected with vertical movements of the land. When the margin of the continent is lifted, the coast line, following a slope new-risen from the sea, is a simple contour on an even plain, and there are no harbors; but when the land is deprest the sea-water enters each valley of the coastal plain, making a bay. Then the waves, driving sand and other land waste along the coast, build a spit across the mouth of each bay, converting it into a sheltered harbor, whose entrance is scoured four times a day by the incoming and outgoing tide. Into the estuaries thus formed the streams build deltas, gradually filling and obliterating them; but so long as subsidence continues they remain open and available for commerce. It is our good fortune that nearly the whole of our coast, both Atlantic and Pacific, is now subsiding,* so that estuaries are numerous and the maintenance of serviceable harbors requires only moderate aid from the engineer. The bays and sounds of San Francisco, Galveston, Mobile, Tampa, Savannah, Charleston, Wilmington, Pamlico, Chesapeake and Delaware are of this type; and the Hudson estuary, which is also a fiord, carries tidewater one hundred and fifty miles from the coast.

Climatically the United States lies within the zone of variable winds. Instead of being swept by continuous trade winds or periodic monsoons, it is traverst at short but irregular intervals by the broad air whirls called cyclones, which bring with them rapid alternations of warmth and coolness, sunshine and rain, breeze and calm; and the direction of the wind is continually shifting. In

^{*}Strictly speaking, the determined fact is that the relation of land to sea is changing and we do not know which one actually moves.

other words, we are endowed with weather instead of mere climatic monotony.

In all parts of our land there is so much of winter that man must provide himself with clothing, shelter and fuel. fruits, to be had for the plucking, will not sustain him, and he is compelled to earn his food. Thus Nature forces him to labor and to contrive, and his physical and intellectual faculties are developt, like the athlete's muscles, by exercise. From variety of configuration, of mineral resources, and of climate, flow varied and complementary industries. Agriculture flourishes in the Atlantic and Central provinces, on the morainic hills and lacustrine plains of the lake district, and, with irrigation, in intervales of the Cordilleras. Its products range from the hardy apple to the frostshunning banana. Along the western borders of the Central plain and in Cordilleran valleys the herdsman tends his bands of horses, kine and sheep. In the humid northwest, in the recesses of the mountains, and on tracts of inferior or scanty soil are forests for the lumberman. In mountains and roots of mountains are ores for the miner, and from the hills he draws fossil fuels. Manufacture finds natural power in waterfall, coal and gas, and the way of commerce is made easy by the harbors of the coast. Thus Pluto and Apollo have prepared the land for that diversity of product and industry which gives national independence and have provided a commercial facility which joins us to the brotherhood of nations.

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THE ENGLISH LAKE DISTRICT.

On a contoured map of England the area known as the English Lake District stands out from the rest of the country as a separate region, having its own orographical structure with a drainage system almost independent of the rest of the country. It occupies a peninsula which fronts the sea in a semi-circular coast-line between Morecambe Bay on the south and Solway Firth on the north, and is marked off on the east by the deep

valleys of the Eden and the Lune, which represent the chord of the semi-circle of coast. A geological map shows that in the character of its rocks also the Lake District is a distinct region; the central parts are composed of very complicated volcanic rocks of Silurian age, lavas and bedded ash, the latter often converted into slate; the coal measures of the Carboniferous formation with their associated limestone form an irregular outer ring, beyond which again there is another broken ring of the less ancient Permian sandstones.

The land is high and rugged in the center, cleft by deep valleys, and this fact is interesting historically, for it was in the Lake District that the enjoyment of fine scenery was first recognized as an aim for travel. The earliest tourists exaggerated what they saw; we could scarcely apply to the Rocky Mountains, the superlatives which they lavished on Borrowdale; but they attracted the artists of the middle of the eighteenth century to the spot, to the enrichment of art. The influence of scenery on poetry has recently been the theme of a charming lecture by Sir Archibald Geikie* in which he shows how largely natural surroundings affect poetic inspiration, and he especially cites Wordsworth and the Lake District as a case in point. But when Wordsworth was a boy a local landsurveyor predicted this influence when referring to the artists who visited the district—"Where painting goes, there generally goes poetry. . . . I may be told that many have heard of the scenes near these lakes; but where are the poets, or the poetry? As I have not leisure for answering such questions at present, I shall leave them to be resolved at another time." If the worthy man had lived half a century longer he would have had no difficulty in answering his question; for by that time the Lakes School of Poets was an established fact.

It is to Wordsworth, the poet of the Lake District, that we owe the first, and still perhaps the best, topographical description of the region; he says in his "Guide to the Lakes:"

"To begin then with the main outlines of the country. I know not how to give the reader a distinct image of these more readily than by requesting him to place himself with me in imagination upon some given point, let it be the top of either of the mountains

^{*}The Romanes Lecture for 1898. Macmillan & Co., Ltd.

Great Gable or Scawfell, or rather let us suppose our station to be a cloud hanging midway between these two mountains, at not more than half a mile distance from the summit of each, and not many miles above their highest elevation; we shall then see stretched at our feet a number of valleys, not fewer than eight, diverging from the point on which we are supposed to stand, like spokes from the nave of a wheel."

Most of these radiating valleys contain lakes, small, it is true, for the whole area is on a miniature scale, but large enough to afford subject matter for more than one lesson in geography. If we accept a position as center a little farther east than Wordsworth's, a radius of five miles would include only a few very small lakes in the upper valleys, and touch the head of Derwentwater in the main valley running north-northwest, and of Windermere in the main valley running south-southeast. A radius of ten miles from the same center would cut the two valleys just mentioned, and would also cross the lake of Crummock stretching northwest, the lake of Ennerdale stretching west by north, Wastwater west by south, Coniston Water due south, Ullswater stretching to the northeast, and would come very near the head of Haweswater stretching due east. A radius of fifteen miles would just touch the outlets of Windermere and Bassenthwaite (the continuation of Derwentwater), while all the other lakes of the district lie within its sweep, and a radius of thirty miles circumscribes the entire district falling beyond St. Bees Head on the west and far beyond the limits of the Lake District on the east. Some of the valleys, it will be observed, contain one lake, some two, one after the other, never side by side, and there are also long radiating valleys which contain no lake at all at the present time.

The mountains are highest near the center, the land gradually sinking to a low flat plain bordering the sea, and the valleys grow wider and flatter as they approach the coast. Scafell Pike, 3,210 feet; Scafell, 3,162; Helvellyn, 3,118, and Skiddaw, 3,054 feet, are the highest summits in England. The crests of the mountains are frequently rocky and rugged, the lower hills are grassy to the top, and the steep sides of many of them are draped with great screes, which give to the valleys a rounded or U-shaped section. A very heavy rainfall, in many places exceeding 100 inches

per annum, ensures a plentiful water supply to the streamlets, which leap from the rocks and foam down the steep slopes to join the larger streams.

It is necessary to point out that although the radiate symmetry is a convenient aid to forming a clear conception of the district, it is neither so simple nor so perfect as our descriptions might suggest. In the east there is a very distinct east-and-west watershed and the branching character of the river sources, each streamlet in its own little ravine, gives an extremely complicated hydrography in detail.

We can not enter here into the geological history of the district. It is obviously a dissected dome of rocks from which the covering strata have been largely stripped, and it has been severely handled by the glaciers of the Great Ice age, their old moraines still clustering near the heads of the valleys, although usually washed away from the lower slopes. The rocks on the floor of the valleys, and the rocky islets in the lakes, are finely scratched and polished by the ancient ice. The whole question of the origin of the existing drainage-lines has been gone into by Mr. J. E. Marr, in a paper in the Geographical Journal for 1896 (Vol. VII., p. 602), which gives references to the literature of the subject. In the previous volume of the same journal (Vol. VI., 1895, pp. 46, 135), I described, with maps, the present characteristics of the larger lakes of the district. The lakes are of two different classes: (1) The small mountain tarns usually nearly circular in form, lying in corries or on flat ridges between neighboring heights, and always shallow. These Mr. Marr has shown to be in almost every case the result of damming by glacial clays, although since the ice age many of them have eroded new channels of outlet through solid rock. (2) The longer lakes occupying the valley floors and usually extending out into the low plain. These may possibly be formed, like the tarns, by masses of clay laid down across river valleys; they may have been excavated by glaciers; they may have resulted from crustal movements tilting up the lower ends of the valleys. It is the duty of the geologist to tell us which of these explanations is the true one; but there are several geologists, and they do not agree. The geographer, strictly speaking, deals only with matters of fact as they exist at the present time; but he

cannot ignore changes now in progress which sometimes lead him back into the dangerous proximity of geological controversies.

The valley lakes of the district are of two main types, the deep and the shallow. The deep lakes have an average depth increasing from 40 feet, in the case of Haweswater, the most easterly, to 134 feet in the case of Wastwater, one of the most westerly. The lakes lie typically in long narrow valleys with steeply sloping sides, the lake filling up the whole breadth of the valley, and the sides continuing the slope of the hills down to an almost flat floor covered with fine mud. In the case of Wastwater, and in some parts of Ullswater, steep scree-slopes are continued under water at an even steeper angle than in the air. The shallow type of lake is only represented by two, Derwentwater, and Bassenthwaite, with an average depth of 18 feet, and a less simple and regular form of floor.

The two largest lakes, Windermere and Ullswater, are divided into distinct basins by shallows bearing groups of rocky islands, which would seem to indicate either a double excavation if the lake-beds were originally scooped out, or a crumpling of the strata if they were produced by crustal movements. But every one of the lakes exhibits, as Wordsworth pointed out long ago, the tendency of rivers to fill up hollows with the débris they bring down. Each small stream throws down its burden as a deltaic cone where it enters the lake, and it is curious to notice how these have developed into long stretches of flat meadow as at the head of Windermere, or into fan-shaped flats filling up what were formerly bays; and off the mouth of these deltas the slope of the sides of the lake is always greatest, except, indeed, in the case of perpendicular cliffs which are occasionally seen. Haweswater, although one of the least of the lakes, possesses, at Measand, the largest delta formed by a stream absurdly small in proportion to the work it has done. But following up that stream one comes on the remains of an extinguished lake in a high valley. Its coast-line can be traced along the hillside, but its floor is thickly grown with moss; and it would appear possible that the emptying of this lake, perhaps by the collapse of a clay barrier, might have led to the formation of the delta below. The great delta would long ago have cut the lake in two, but for the fact that the strong wind in

the valley causes a current to sweep through the narrow channel which remains, and prevents the deposit of detritus there.

Once, there can be no doubt, Buttermere and Crummock formed one lake. But the stream called the Mill Beck, rushing down the steep hillside on the right bank formed a delta like that at Measand, which, aided by the Sour Milk Gill on the other side, filled the great trough right across, and now leaves only a little shallow stream flowing close along the left bank through the level deltaic meadow for three-quarters of a mile from Buttermere to Crummock.

The broad alluvial plain between the two shallow lakes, Derwentwater and Bassenthwaite may probably be traced to a similar action on the part of the river Greta, which may have divided what may once have been the largest lake of the district into two. Every one of the larger lakes has its own special characteristics. Windermere is the longest, has the greatest volume of water and extends deepest below sea-level; Derwentwater is the widest, shallowest and richest in islands; Bassenthwaite has the largest area of land draining into it; Wastwater is the deepest both in average and maximum (258 feet), but, as its surface is 200 feet above the sea, it does not descend so far as Windermere below sea-level; Coniston the narrowest of the large lakes; Crummock is the steepest-sided and flattest-floored; Ullswater is the most complex in outline and in the number of its basins; Ennerdale unites the deep and shallow types, and Haweswater lies highest above sea-level and is unique in the size of its lateral delta.

Some of the lakes are inhabited by peculiar fish, not found elsewhere; one of these, the charr, gives rise to a small fishing industry. The land of the district is infertile and only the deltas and valley bottoms can be cultivated; few cattle, although many sheep, are kept. I met in one of the remote valleys a boatman born in the place, who had never been ten miles from home, never seen a railway or a gas or electric light; he had brought up a family of thirteen children entirely on Swiss milk and American flour; a curious instance of the union of the old isolation of the district with the results of modern intercommunication. Mineral resources were once valuable; the bloomeries of the Romans show how extensively iron was worked on the lake-sides eighteen cen-

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CLIMATIC NOTES.

turies ago; the graphite of Borrowdale was once renowned, but the pencil factories which were started at Keswick to utilize it now put up graphite from Ceylon or Siberia in sticks of Florida cedar. Lead is still mined near Ullswater, but the beauty of the scenery is the main resource of the country and a respectable population is maintained by tourist traffic. The old artistic associations have been revived by the establishment of home industries, spinning, weaving and the manufacture of artistic metal and wood-work in several of the small towns of the Lake District proper; while on its margin the coal fields of Whitehaven, and the rich hematite ore of Ulverston, have given rise to busy modern centers of industry. The growth of Barrow-in-Furness as a great iron working town and seaport, has been almost as rapid as that of the cities in the American far West.

One other natural resource depends on the configuration and climate which provide steep rock slopes and heavy rainfall. This is the supply of pure water in the vast quantities utilized in part for the electric lighting of Keswick, in part stored up in the half artificial reservoir of Thirlmere for the supply of Manchester. It is not a little curious to observe that an appreciable fraction of the water in the Manchester ship canal flowed down the slopes of Helvellyn and should, in the course of nature, have reached the Irish Sea at Workington instead of at Liverpool.

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CLIMATIC NOTES MADE DURING A VOYAGE AROUND SOUTH AMERICA.

(Continued from page 248.)

On the fourth day after entering the southeast trade the trade type of weather was considerably interfered with by the proximity of the land, the ship's course taking us near enough to Cape San Roque on June 20th to allow the high land on shore to be seen. The development of alto-cumulus and heavy cumulus clouds over the land, while out to sea only small cumuli were visible, the variability

of the wind, which came irregularly from east-southeast and south instead of from southeast, and the frequent showers during the day were all new features, and were due to the neighborhood of the land. This observation serves to emphasize the fact, which is too often lost sight of, that the trades are not nearly so regular or so marked where they approach the land, in many cases, as they are over the open ocean. During the night there were frequent heavy rain squalls, and the day following, on which Pernambuco was reached, was more or less rainy, with overcast sky and frequent showers, the wind being light southeast most of the day, but coming also from south and southwest. The temperatures during the day were between 75° and 78°, but the high humidity (over 90%) made the atmosphere seem close and muggy and very different from the freshness in the trade.

Pernambuco, situated just south of the extreme eastern point of South America, is exposed during most of the year to the strong southeast swell produced by the southeast trade, and landing is therefore often very difficult, as all vessels except those of small size have to anchor at some distance off-shore, exposed to the full sweep of the long rollers. Small vessels can enter the inner harbor, formed by a long, narrow coral reef, against which the waves continually dash with magnificent effect.

The rains experienced at Pernambuco, due to the onshore winds and to the presence of high land near the coast, are a good example of the coast rains, whose maximum comes in the winter, when the sun is north, and the southeast trade strongest in this latitude. The annual rainfall here is somewhat over 100 inches. A return to typical trade conditions on the following day, when offshore on the voyage to Bahia, further emphasized the fact that it is the influence of the land which disturbs the normal trade weather met with away from shore. On approaching Bahia and while at anchor in its harbor, cloudy and rainy weather was again experienced; the wind, however, held from the southeast. The diurnal range of temperature, only two or three degrees over the ocean, rose, in Bahia harbor, to 18.9°. During the rainy season showers are said to fall every day in Bahia.

On the southward voyage to Rio, the southeast trade was lost in latitude 16° south, the wind becoming weaker and weaker

from southeast, until there was a complete calm, and then followed the light and variable winds characteristic of horse latitude weather. For two days the rapidly rising barometer, variable winds, fair weather and low relative humidity (40%-45%) continued. Rio harbor was entered on June 28, twenty-three days from New York.

Rio de Janeiro, lying close upon the tropic of Capricorn, is under the control of the South Atlantic barometric maximum during most of the year, and hence has very equable conditions. The mean temperatures of February (79.9°) and July (70.2°) differ by less than 10°, and rain falls in every month. During the writer's stay in Rio, at the end of June, the temperatures ranged between 65° and 70°, and the weather was cloudy a good deal of the time, with showers almost every day. It was somewhat too warm for exercise during the warm hours of the day, but pleasantly cool after sunset, so that a light overcoat was not uncomfortable in the evening.

It was a great surprise to the writer to find the climate of Rio at this season by no means disagreeable, because he had the impression that the atmospheric conditions there are always unbearable, and that even a short stay in the city should be avoided at all seasons. It was, to be sure, rather too warm during the middle hours of the day, but the nights were comfortable. Furthermore, with proper precautions, even a stranger is not apt, under ordinary circumstances, to fall a victim to the dreaded yellow fever, that has given Rio its bad reputation. A stay of ten days in Rio, and conversation with a good many of its citizens, convinced the writer that the climate is not nearly so bad as it has been painted. It is not the climate which is bad and unhealthy, as is generally supposed. It is the entire absence of anything like proper sanitary measures for disposing of the city's sewerage that is to blame for the continued prevalence of yellow fever in Rio. The climate is not bad. Indeed, an American who has lived many years in the city assured the writer that he considers it the finest climate in the world. But the fact that, ever since the city's foundation, the sewerage has been emptied into the harbor and the additional fact that this harbor, although embracing many square miles of water surface, has only a very narrow entrance from the ocean, so that there is but little wash in and out

by the tide, has resulted in polluting the waters of the bay until they have become a veritable storehouse of disease. This is generally believed by the more intelligent inhabitants of Rio to be the chief, if not the sole, cause of the unhealthiness of the city. The waters of the bay are so foul that foreigners will not bathe in them, and ships which visit Rio either do not wash down their decks at all during their stay in port, or else buy fresh water to be used for that purpose.

It is a well known fact in medicine that elevation above sea level in the tropics secures immunity from many characteristically tropical diseases which prevail close to sea level. This is very markedly the case with yellow fever. This disease, perhaps more than any other, has certain restricted districts and certain special seasons in which it prevails. It is confined chiefly to large seaports, or to shipping centers on navigable rivers at or close to sea level in warm latitudes. With increasing elevation above sea level the disease becomes less and less prevalent, and when a sufficient altitude is reached, the yellow fever zone is left behind. In the vicinity of Rio there is a charming little spot, situated in the mountains at an altitude of 2,700 feet above the sea, which is much frequented by the wealthier classes of Rio during the summer season. This place, which is called Petropolis, owes its popularity chiefly to the fact that it is quite above the yellow fever and malaria zone. No case of the fever ever had its origin there, although persons who had caught the disease in Rio have occasionally been taken sick with it in Petropolis. Furthermore, the altitude of Petropolis ensures its having cooler evenings and nights than Rio, and places it above the low-lying and unhealthy fogs which are common over Rio harbor and city at night. The general undesirability of Rio as a national capital, owing to its unhealthiness, has led to the plan of moving the seat of government to a more elevated and more central location in the interior province of La Goyaz. the new Federal Constitution, adopted when the Republic of the United States of Brazil replaced the Empire, there is an article which says that the seat of government shall be moved to the province of La Goyaz, but as no date for the removal is specified, and as the necessary funds are lacking, no change is likely to be made at present.

Immediately after leaving Rio, on the voyage to Buenos Aires, a marked change in weather conditions was noted, showing in the most striking way that the latitudes where cyclonic storms are absent were being left behind, and that the ship was approaching those where such stormy overturnings of the atmosphere are frequent. The three days of the voyage were marked by a strong squally southwest wind, overcast sky and high sea, with temperatures decidedly lower (55°-60°) than those noted in Rio, and with a high relative humidity which made the air seem very chilly after the preceding weeks in the tropics. The contrast between these conditions and those of the trades was most striking, and served to teach an important climatic lesson. The change in the clouds, too, was interesting. In place of trade cumuli, and the dull leaden sky of the doldrums-cloud forms unfamiliar to the writer until he took the present trip-this voyage brought back the old familiar cloud types of the extra-tropical latitudes of home.

A noteworthy illustration of the different physiological effects caused by a difference in the temperature and humidity conditions brought by two contrasted weather types, is well known to residents in Buenos Aires. One type is that known as the norte. This, which corresponds to our own sirocco in the eastern United States, is a warm, damp, northerly wind, the indraft from more northern latitudes into a cyclonic storm passing over the Argentine. This wind, very damp and usually accompanied by heavy rains, is very depressing and uncomfortable, and makes most people irritable and ill-tempered while it lasts. Its effects on people are well known and employers of labor are well aware, as the result of experience, that their employés never work as rapidly or as well under the norte. The writer was told, on the best authority, that two prominent establishments devoted to millinery and dressmaking make an allowance in filling their orders for the delay and the poorer quality of the work done by their employés, occasioned by the nortes. This may seem an exaggerated statement to some readers, but exactly similar instances are to be found in the case of manufacturing establishments in our own country and in other countries, whose daily out-put depends, to a noticeable degree, upon the prevailing weather conditions and upon the influence of these conditions upon the employés. The contrasted weather type in Buenos Aires is that which prevails when a south-west wind is blowing. This wind, called the pampero, coming across the great expanse of the pampas, corresponds to our own northwest wind at home, and is the rear indraft into a cyclonic center. The southerly wind is cool, dry and bracing. It makes people feel bright, cheerful and energetic. The contrast is interesting and is worth noting as giving another example of the marked physiological effects produced by different weather types. The exclamation of the earliest arrivals in this region "que buenos aires son estos," must have referred to the conditions which prevail with a southerly wind, and not to those which the norte brings. The name Buenos Aires perpetuates, as is often the case with geographical names, a climatic feature of the region in which the city lies.

A journey across the pampas to Cordoba or Mendoza, serves to give the traveler a far better idea of these vast level stretches of plains than he can ever obtain from books or pictures. Over the greater part of these pampas, but recently elevated above the surface of the ocean, there is sufficient rainfall to supply the needs of the grass that grows here in such profusion, and which furnishes. sustenance for numberless herds of cattle. Cattle-raising is the chief occupation of the people in this part of the Argentine, the controlling factors in determining this occupation being the geological history of the region, which has resulted in producing these vast level plains, and the climate, which is favorable to the abundant growth of fodder. With increasing distance from the ocean there is a decreasing rainfall in the latitudes of the prevailing westerly winds, and, therefore, during the dry season immense herds of cattle are driven over from the Argentine into Chile, across the famous Uspallata pass. The contrast between the rainfall conditions on the two sides of the mountains at this point is most striking. On the Argentine side everything is dry and barren; on the Chilean side everything is green. The Uspallata pass, about 13,000 feet high, is by far the most travelled mountain route from one side of the continent to the other. The railroad is now built as far as Salto del Soldado on the Chilean side, and as far as Uspallata on the Argentine side; the intervening space, involving the crossing of the top of the divide, is passed over in a day's journey, partly by carriage and partly by mule. The Pass

can, as a rule, only be crossed by travellers in summer. During the winter the snow renders the journey very disagreeable and also dangerous. Occasional travellers, as well as the mail couriers, do cross the Uspallata in winter, but by far the greater portion of the winter travel goes by way of the Strait of Magellan.

A rather notable instance of the climatic control over human migrations is to be found in the Argentine Republic, according to Mr. W. G. Davis, Chief of the Argentine Meteorological Office. The northern, warmer provinces, where the climatic conditions are most like those of their own country, Italy, are settled chiefly by Italians. The central and southern provinces, on the other hand, are peopled chiefly with immigrants from the north of Europe, who find in these cooler districts climates more like those to which they have been accustomed in their old homes. When Italians happen to settle first in the southern provinces, they almost invariably move north after a time. A similar climatic control over migrations is seen, in a large way, in the case of European immigration into the United States, although in this case many other controlling causes, such as the ports at which the immigrants land, the location of the large cities, etc., come in to complicate the result.

The next portion of the voyage, from Buenos Aires to the Falkland Islands, took the ship through one more day of horse latitude weather, with clear skies, light and variable winds, fresh bracing air and high barometer, and then came the marked changes which were unmistakable signs of an entrance into the latitudes of the prevailing westerly winds, within which the remainder of the voyage to Valparaiso was made. Perhaps the fading away of all marked traces of the diurnal variation of the barometer, and the steady fall in pressure, together with the beginning of the irregular cyclonic variations in pressure so characteristic of the prevailing westerly winds, especially in winter, were as striking indications as any that the diurnal quality of trade and doldrum and horse latitude weather had been left behind. The beginning of the régime of the prevailing westerlies came at about latitude 40° S. A brief account of the meteorological conditions experienced on the voyage to the Falklands, as well as some notes on the climate of those islands and on the climatic control over the occupations and over the food of the natives, have been given in the writer's "A Day in the Falkland Islands" (see this JOURNAL, Vol. II., p. 49-56, February, 1898).

From the Falkland Islands west to the Strait of Magellan the conditions during the first twenty-four hours were a splendid example of a fine day in the prevailing westerlies—a rather rare type during the winter months. With a fresh west-northwest wind, small fracto-cumulus clouds, a bright blue sky and the ocean surface just sufficiently roughened by the wind to give it white caps without causing too much motion to the vessel, such were the conditions as far as Cape Virgins, at the eastern entrance to the Strait. this point on through the Strait and up the west coast for the next seven days, as fine a succession of the usual winter weather types of the prevailing westerly winds of the southern hemisphere as could be desired was met with. Day after day brought the same howling gales from between northwest and southwest; the same continuance of rain or snow squalls; the same rough sea and overcast sky-the latter occasionally clearing off for a few hours and then clouding over again—and the same cold, damp, chilly atmosphere. This is, in a word, the prevailing winter weather type over the oceans of the far southern latitudes, and often as the writer had read of these conditions and clearly as he thought he understood them, that week of howling gale, and rough sea, and straining ship, taught him more than all the descriptions written by others could possibly do. It may be noted here that the climate of southern Patagonia, dull and cheerless as it is during much of the year, is remarkably well adapted to the raising of sheep, and every year this is becoming an increasingly important industry in this section. Punta Arenas, which began its existence as a Chilean convict settlement, is now a flourishing and progressive town, the number of whose inhabitants is rapidly growing.

The Strait of Magellan is used by all steamers which have to go around the southern end of South America, while sailing vessels are obliged to round the Horn, owing to the narrowness of the Strait and the difficulties of navigation through it. The voyage around Cape Horn from the east is usually a very stormy and tedious one, as it is made in the teeth of the prevailing westerly winds, whereas vessels passing the Horn from the west usually have

fair winds. The long, narrow and irregular waterway between the islands off the southern coast of Chile and the mainland, known as Smyth's Channel, has been used to some extent by steamers on account of the smooth water found in it, but navigation through the channel is very dangerous, and at the present time only a few of the smaller steamers use it in preference to the open Pacific. A few scattering families of Fuegian Indians are still to be found along the shores of Smyth's Channel, they having gradually retired from the Strait of Magellan in consequence of the increasing traffic through that region.

The great climatic interest of the west coast of South America lies in the contrasts between the heavy rainfall on the southern coast of Chile, the intermediate barren desert belt of northern Chile and Peru, and the heavy rainfall on the coast north of Cape Blanco and Pt. Parina, the westernmost point of the continent. These differences in rainfall, which have a close analogy in the rainfall on the western coast of North America, are due to the prevalence of the northwesterly, and hence on-shore, cooling winds in the south; the cool southerly, and hence warming, chiefly alongshore, winds further north, where lies the barren desert strip, and then, in Ecuador and Colombia, the presence of the equatorial rainy belt. These belts of winds and rains migrate north and south after the sun, and hence there are rainy and dry seasons on the coast of Chile and of Ecuador. Just so, on the coast of California, migration of the tropical high pressure belt over the North Pacific involves the rainy and dry seasons which are so marked a feature of the coastal districts of that state. There is no more instructive a sea voyage in the world than that from the Strait of Magellan up the west coast of South America as far as Guayaquil or Panama, with frequent stops at the many ports along this coast. It teaches a lesson in meteorology which no books or charts can ever teach.

Corral (lat. 39° 52′ S.) was the first port on the west coast at which a stop was made. Here, with prevailing west and northwest winds throughout the greater part of the year, the mean annual rainfall is heavy, amounting to over 100 inches. This abundant precipitation, combined with the absence of extreme cold, favors the growth of a luxuriant vegetation. The surrounding

hills are heavily wooded, and the cliffs are almost concealed beneath a cover of moss, ivy and ferns. The contrast between this vegetation and the barren desert slopes along the coast further north, is most striking. Indeed, the climatic contrasts between southern and northern Chile exercise a most important control over the occupations of the inhabitants, as has been shown in the writer's recent paper in this JOURNAL, "The Climatic Control of Occupation in Chile" (Vol. II., pages 289–292, December, 1897), to which the reader is referred.

The decreasing rainfall towards the north, as the latitudes are reached where the rain-bringing westerly winds blow during a part of the year only, was noted in its effects upon vegetation as seen at Coronel and Talcahuano, the next ports at which the steamer stopped. At neither of these places was there such abundant vegetation as was noted at Corral, there being grass and shrubs near the sea coast, instead of the heavy tree growth seen further south. Coronel and Talcahuano are well within the agricultural zone of Chile. Further south, in the provinces where the rainfall is heavy and the forest growth dense, lumbering becomes the chief occupation of the people, and further north, the absence of rain withdraws agriculture from the list of occupations, mining and the nitrate industry taking its place.

Valparaiso lies about at the northern limit of the zone over which Its mean annual rainfall is about 13 inches and comes during the winter months, when the sun is north of the equator. During the writer's stay in Valparaiso (August 14-28) it was near the end of the rainy season. The dominant weather type was clear, with light southerly winds and temperatures between 50° and 55°. This type was interrupted by two spells of cloudy weather, with northerly winds. Valparaiso possesses one of the beautiful harbors of the world, but this harbor, although well enclosed towards the south, is open to the north. When a norte, the indraft from lower latitudes towards a cyclonic center, blows, as it often does in the winter season, and with considerable violence, the vessels at anchor in the bay are obliged to steam or be towed out into the open ocean, in order to avoid being blown ashore. All the vessels in the harbor are anchored heading to the north, and are secured with double bow anchors and usually two stern lines made fast to

buoys as well. In summer, Valparaiso has a very violent sea breeze by day, as graphically described by Maury, which is so strong, and raises so much dust that people stay indoors as much as possible during the hours of its greatest strength. The exceptional development of this sea breeze is due to the prevailing onshore winds, and to the rapid warming of the bare hillsides around the bay.

The remarkable desert belt which begins a short distance north of Valparaiso and extends to about latitude 3° south, is one of the most interesting regions in the world, climatically, geologically and historically. It was in this coastal strip that many of the scenes of the Spanish Conquest were laid. It is in the southern portion of it that the rich nitrate fields of northern Chile lie, whose development has lately played so important a part in the financial history of the world, and which, captured by the Chileans in their late war with Peru, have ever since furnished the chief part of the Chilean revenue. The controlling factors producing the absence of precipitation along this coast are the presence of the great Cordilleran range to the east, and the cold ocean current, accompanied by cool southerly and southwesterly winds, which flows northward along the coast. These southerly winds, the spiral outflow on the eastern side of the South Pacific barometric maximum, cooled by the cool ocean water over which they blow, are decidedly warmed when they blow over the warmer land, and thus become drying winds, their capacity for water vapor being increased as their temperature is raised. Although the presence of a range of hills near the sea along the greater part of this west coast, obliges these southerly and southwesterly winds to climb, and the adiabatic cooling produced by their ascent is usually sufficient to cause cloudiness, the cooling is not carried far enough, under ordinary circumstances, to produce rain. As long as the southerly winds and the cool ocean current follow the coast, so long is the coastal strip dry and barren. As soon as the winds and the current turn off-shore, the previously barren shores become covered with vegetation. Analogous examples are to be found on the west coast of North America, and on the west coast of Africa.

At Coquimbo, the first port north of Valparaiso, the mean annual rainfall is said to be less than two inches, and the general desert aspect of the place, although there is still a little green to

be seen, is sufficient proof that we are near the limit of rainfall. Caldera, the next port north, has a rainfall of less than half an inch, rain falling only once or twice a year, in winter. North of Caldera the well-known nitrate ports of Tocopilla, Iquique and Pisagua are passed, and here is the driest part of the desert strip. The writer's journal during this part of the voyage, as far north as Paita (about 5° south of the equator) shows a constant repetition of the same conditions—light southerly winds, smooth sea, and a belt of cloud along the coast, extending, in some cases, several miles out to sea. This coast cloud is a very marked phenomenon more or less all along the coast north of Valparaiso. It extends inland ten or fifteen miles at the points where the writer was able to make observations on it, and its base is between 2,000 and 3,000 feet above sea level. The coast all along presents the same features of brown barren hills and yellow sand, the monotony being relieved only where irrigation makes possible the growth of some vegetation. The water for the coast ports is, in most cases, brought from a distance of many miles inland. At Iquique and Mollendo, for instance, it comes in pipes about one hundred miles across a barren desert country where nothing can grow except where water is supplied from the pipes, either at stations or through leakage.

At Arequipa, lying in Lat. 16° 22' S., long. 71° 15' W., about in the center of the desert belt, and somewhat less than 100 miles from the coast, is the Southern Station of the Harvard College Observatory. The choice of Arequipa as the permanent site for this Observatory was due to the fact that the meteorological conditions are here very favorable for astronomical work. Situated at an elevation of 8,050 ft. above sea level, and at a considerable distance inland, the Observatory is removed from the zone frequented by the coast cloud, and during eight months of the year the sky is almost always clear. The cloudy and rainy season (December-April) is due to the fact that Arequipa lies far enough north to come within the zone of equatorial rains, when the sun is south of the equator and while it is going north again to cross the equator. The rainfall is less than three inches a year, however, and agriculture is only possible where the soil is irrigated. No observatory in the world is so favorably situated as regards the meteorological possibilities for astronomical work as that at Arequipa.

Twenty miles northeast of Lima is Mt. Harvard, so called because occupied in 1890 as a temporary station by the Harvard College Observatory party, before Arequipa was finally chosen as the site for the permanent observatory. Mt. Harvard (6,600 ft. above sea level) offered favorable opportunities for astronomical work, being situated in the dry belt, and far enough inland to be beyond the reach of the coast cloud. Arequipa, however, was found to offer even greater advantages and therefore the Mt. Harvard station was abandoned.

An interesting lesson in the effect of elevation above sea level in modifying climates may be learned by anyone who takes a trip up the famous Oroya Railroad, from sea level at Callao, to a height of 12,178 ft. at Oroya, passing on the way, at the Galera Tunnel, a height of 15,665 ft., the highest point reached by any railway in the world. The first part of the journey is through fields of sugar cane and cotton; at 5,000 ft. a zone of fruit trees is passed through; at 10,500 ft. there is a district famous for its potatoes, where little else is grown; above this the altitude is so great as to preclude the growth of anything but grass. At the highest point reached the snow lies on the mountain summits throughout the year, and the traveller may enjoy a snow storm in the middle of summer (December-February). In the valley of Oroya farm produce is again seen growing. This whole succession of climates may be passed through in the short space of ten hours—an opportunity which is offered to the traveller in no other place in the world.

Before leaving Peru, attention should be called to a very marked climatic contrast between the desert coastal provinces and the northeastern Amazonian provinces, where the rainfall is abundant. In the former Nature herself produces nothing in the way of vegetable food and man can only permanently live where, by his own efforts, he has provided a water supply. It is a constant struggle against Nature to make her produce anything green, and habitability, without man's own efforts, is impossible, by reason of the absence of vegetation. In the Amazonian provinces, on the other hand, the abundant rainfall produces so much vegetation that habitability is almost impossible by reason of this very abundance. Clearings made in the dense forests are overgrown almost as soon as they are made. Nature here becomes the enemy of man,

through her very luxuriance, while in the coastal districts she is his enemy by reason of her barrenness.

The transition from the district over which rain falls in the south, to the desert strip, has been described as being gradual. In the north it is astonishingly sudden. Just north of Paita, at Pt. Parina, about 100 miles south of Guavaquil, there comes so sudden a change in climatic characteristics that no traveller can fail to be struck by it. This last port in the dry belt, Paita, was left, on the writer's trip in the evening. Here the same barren hills and sandy stretches were seen that had become familiar objects during the voyage up the coast from Caldera. The weather conditions at Paita were southerly wind, fair weather and comfortable temperature (70°). On the morning following, these conditions had completely changed. The temperatures were between 77° and 82°; the humidity very high; the atmosphere close, muggy and uncomfortable, and the wind, no longer from the south, was light and The sky, furthermore, instead of being clear or fair, variable. was overcast with strato-cumulus and cumulus clouds. In fact, all the conditions savored of doldrum weather again. But not less striking than the change in atmospheric conditions was the change in the aspect of the country. In place of the dry and barren strip which had been seen the day before at Paita, the island of Puna, which was then in sight, was heavily wooded to the water's edge, and the banks of the river, on which Guayaquil lies, and the hills in the background, were also covered with trees. While the steamer was at anchor off Guayaquil heavy rains fell, and in every way there was the strongest possible emphasis on the change The reason for this sudden change is to in climatic conditions. be found in the fact that the cold current from the south, and its accompanying cool southerly winds, leave the immediate seacoast at Pt. Parina, the Peruvian Current continuing on to the northwest and west, in its great spiral eddy around the South Pacific Ocean. Hence one great cause of lack of rainfall, as above explained, is removed. The equatorial rainy belt, which extends over this region between December and April, with its hot moist air and heavy showers, becomes the controlling factor in the climate, and hence the abundant vegetation which is so marked a feature hereabouts. The rainfall along the coast of Colombia averages over 75 inches a year.

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From Guayaquil to Panama, a voyage of three days, the weather was cloudy or overcast, with heavy showers during the nights, temperatures between 75° and 80°, relative humidity 85%-95%, and, during the last two days, light northerly winds. The conditions were very uncomfortable, like those of true doldrum weather, and very unlike those which prevailed along the coast further south, where the winds were southerly, the temperatures and humidity considerably lower, and where rain was entirely absent. At Panama, although the rainy season proper (May-December) was over, the month being January, several brief showers fell during the few hours which were spent there. In the railway trip across the Isthmus to Colon the dense tropical vegetation along the line was a sufficient indication that the annual rainfall is heavy over this district, and during a week's stay in Colon, with temperatures over 80° day and night, and relative humidity averaging 80 %, a final lesson was learned in the general physiological effects of such a tropical climate upon a person accustomed to the more severe and changeable climate of northern latitudes. The feeling of laziness, of disinclination to take any exercise that was not absolutely necessary, and of carelessness as to whether or not any work was accomplished, which even this short stay in this climate began to bring upon the writer, made him realize, as he never did before, how important is the control which climatic conditions exercise over the occupations and general activities of men.

In preparing the foregoing account, the writer has frequently consulted Hann's *Klimatologie* for the purpose of verifying and amplifying his own notes and observations.

ROBERT DEC. WARD.

COLON, COLOMBIA, January, 1898.

NOTES.

Britain, Great Britain and England.—The receipt of a communication from one of the most important business associations in New York, as well as from the JOURNAL OF SCHOOL GEOGRAPHY, addressed Edinburgh, England, and even Edenburg, England, has suggested that a note on the proper usage of certain

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political and geographical terms for the British Isles and parts thereof may be useful to teachers in America, and also to some in Britain and elsewhere.

It is a common mistake to use the terms England and Britain as synonyms; but it is just as inaccurate to write Edinburgh, England, as it is to write Munich, Prussia, or Chicago, New York. England is the name for a political division of the United Kingdom of Great Britain and Ireland, as New York is for a political division of the United States of America. The Kingdom of England, together with the Principality of Wales form the southern part of the island of Great Britain, whose northern part is the Kingdom of Scotland. England, Wales, Scotland and Ireland are four historical and political divisions, with definite boundaries, and these terms should never be used except with this perfectly definite signification.

The adjectives derived from these words are employed geographically with precisely the same limitations. In linguistic and racial descriptions they may have a wider significance, especially in the former. English is universally used to denote the language spoken by the majority of the inhabitants of the British Isles and of descendants of inhabitants of the British Isles all over the world. English may also be used instead of the more precise of English Origin, for descendants of Englishmen living outside England. Any other extended use of the adjective English is in-For instance, there is no English Embassy any more accurate. than there is a Welsh one, no English Navy any more than there is a Scottish one, no English Army any more than there is an Irish one. There are only two possible adjectives which can be used to express the idea of belonging to the United Kingdom of Great Britain and Ireland, the Britanniam of our coins, Britannic or British, and the latter is that most commonly adopted, although we have the diplomatic phrase "Her Britannic Majesty" and H. B. M. S.

We may shorten this long phrase, the United Kingdom of Great Britain and Ireland, to the United Kingdom, as the United States of America is commonly called the United States. But the term Britain may also be used for the United Kingdom of Great Britain and Ireland; and perhaps it would be well to

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employ it in the political sense and so distinguish the political unit of the United Kingdom from the geographical aggregate of the British Isles, which includes the United Kingdom and the Isle of Man. It is better not to use Britain as a shorter expression for the island of Great Britain, as this results in endless confusion. It is quite inaccurate and confusing to employ the term Great Britain for the United Kingdom, as is not seldom done by foreign writers, and the not uncommon usage of England for the United Kingdom is still more indefensible.

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There is no difficulty then about the use of the substantives, England, Great Britain and Britain, except that Britain sometimes does, and sometimes does not, include the Isle of Man. The difficulty consists in the exact limitations to be given to the adjective British.

As far as the British Isles are concerned it may have (1) a major geographical significance descriptive of the whole archipelago, (2) a political significance descriptive of the United Kingdom, and (3) a minor geographical significance descriptive of the island of Great Britain, a sense in which it should never be employed except in comparison with other parts of the British Isles.

The extension of the territories whose head is the Parliament of the United Kingdom of Great Britain and Ireland, necessitates a term for the whole. The best term, because it expresses facts and not political theories, is British Territories or British Possessions. British Dominions is not comprehensive, for it omits India. British Empire is even more inaccurate, but it is much used on account of its convenience. It is the nearest English equivalent for the German Weltreich. Britannic Confederation has been proposed, but expresses an ideal rather than a fact. There is no comprehensive political term, for this is the only instance of such complicated political relations existing between peoples in different parts of the earth's surface. The adjective British is used in the widest sense as descriptive of the whole British Territories.

There is a difficulty about nomenclature here which may be discussed in a later note. This is not done now in order that there may be no confusion between terms which have a definite meaning, and those whose significance is not yet fixed.

A. J. H.

Navigable Rivers of the Atlantic Coast.—On the Atlantic Coast the navigable portions of the rivers are short, but in general they increase in length southward. The following table lists the principal of them, with a rough estimate of their navigable lengths, measured as straight lines:

	Navigable to	Miles.
Penobscot, Me.	Bangor	30
Kennebec, Me.	Augusta	50
Connecticut, Conn.	Hartford	40
Hudson, N. Y.	Troy	150
Delaware, N. J. and Pa.	Trenton	75
Potomac, Md.	Georgetown, D. C.	100
Rappahannock, Va.	Fredericksburg	90
York, Va.	_	50
James, Va.	Richmond	75
Roanoke, N. C.	Weldon	75
Pamlico, N. C.		50
Neuse, N. C.	Goldsboro	100
Cape Fear, N. C.	Fayette	100
Waccamaw, S. C.	•	75
Great Pedee, S. C.		100
Santee and branches	Columbia	150
Savannah, Ga.	Augusta	125
Altamaha and branches, Ga.	Milledgeville & Macon	300
St. Johns, Fla.	Sanford	125
		1,860

-Stanford's Compendium, North America, Vol. II., p. 400.

A Word on Geography Questions.—How quickly boys learn to group phenomena, like figures of speech, under principles of resemblance, contrast and association! For instance, a passing comparison of India with Africa—a low oblong in the north running from east to west, and a high triangle in the south running from north to south, the division being the equator in Africa and the tropic in India—was remembered by nearly all the boys of a large class. Consequently, I often set questions which involve these points, and I should like to know how far other teachers find it dangerous to encourage inferences of the kind. The following is a typical question:

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What inferences may you fairly draw from the following coincidences?

- 1. Liège is the same size as Newcastle; and, like Newcastle, it is famous for glass, chemicals, coal, cannon and machinery.
- 2. Rotterdam is the same size as Bristol; and, like Bristol, it is a river port, with a large trade in sugar, tobacco and cocao.
- 3. Trondhjem is the same size as Canterbury; and, like Canterbury, it is a great ecclesiastical metropolis, with a very old cathedral.
- 4. Leipzig is the same size as Edinburgh; and, like Edinburgh, it is a university town, with large beer, paper and printing industries.
- 5. Quebec is the same size as Greenock; and, like Greenock, it is being supplanted by a port farther up the same river.

There are obvious dangers in such questions, but pupils certainly find them rather fascinating. Are they too dangerous to be encouraged?

L. W. L.

Travel in Upper Burma.—Travel in Upper Burma is not all that might be desired, as may be seen from the following extracts from the Scottish Geographic Magazine, for April, 1898.

When one makes a tour at right angles to the main lines of communication in Burma, one finds a cart road for so many marches and a bullock or mule track for the rest. On the plains the travelling is easy, if the rain has not turned the black-cotton soil into a trough of viscous mud, through which the earts are dragged by bullocks wading over their knees in the mud. In hilly regions there is less mud, but frequent rains wash away the road, which must be repaired by each new traveller to permit his wagons to pass. At intervals of two miles or a little over are "sit-downs," generally a favorite tree selected because of its dense and wide spreading shade, beneath which all native travellers have their sit-down and smoke. Passing travellers here stop to exchange news, and, if it is interesting, they may even postpone their further journey for the day.

When the end of the wagon track is reached, all goods for transportation have to be made up in forty-pound bundles to be slung, one on each side, over the backs of bullocks. The loads are packed

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in baskets at either end of a crossbar which, by equal divisions of weight, balances on a cushioned saddle. Neck and tail ropes keep the load from slipping backwards or forwards as the animals go up or down hill, but nothing except balance keeps them from sliding round the animals' girths. Consequently, it is no unusual experience for the load to slide down and the bullock to trip over it. In the subsequent struggle to get free, all breakables are sure to suffer.

A native bazaar, which generally occurs every four or five days, is thus described: "The bazaar building consists merely of several long parallel rows of thatched roofs supported on bamboo posts, with a bamboo flooring underneath, raised about eighteen inches from the ground. On this flooring the merchant squats and spreads out his merchandise. The jeweller is there with his stock of ready made samples of ornaments for women and betel-nut boxes for There is the pottery man, who sells water-pots and earthenware vessels of all sizes and shapes down to the bowls of pipes; the china man with his teapots and cups; the general merchant who can supply you with anything, from English, Indian and China silks to needles, pins, thread and a hundred and one small articles which he seems to find a market for. In another row you have the butchers' shops, where you can get beef, if a bullock has been ailing past recovery, and pork or venison, if the hunter has been Farther on there are eating house stalls; if you are a brave man and can face the awful and penetrating odors which emanate from that quarter, you will take an interest in the menu. On the outskirts of the whole, the women are selling vegetables and edible roots, the men are dealing in ponies, buffaloes or bullocks, and under a shady tree close by a mild gamble is going on."

At one village a fair was in progress and the travellers had an opportunity to witness a native play.

"The play takes place under a circular thatched roof supported by bamboo posts and open on all sides. The orchestra squats inside a circle of drums of all sizes and shapes. These are beaten furiously and apparently at random by any member who happens to have a hand or foot unoccupied at the moment. There are other instruments, too, brass and reed. The result is terrific, the din excites your blood like bagpipes, and you, too, want to beat NOTES. 317

the drum. Close by the orchestra is the dressing room. There are no partitions or curtains to screen it off from the public gaze. It is simply a space set apart for the purpose. The dancing girls produce hand-glasses and powder-boxes and perform their toilet in front of you and while the play is going on. Whatever part of the circle is not monopolized by the orchestra and the dressing room, is the stage. There is no entrance money, presumably because there is no entrance, or rather, because the building is all entrance. The company is paid a fixed sum to perform at the fair, and is generally fed at the expense of the village it happens to be staying at."

Siam.—Siam has a population variously estimated from 7,000,000 to 10,000,000, but the true figures are probably about 8,000,000. Its area, which approximates 250,000 square miles, or nearly the size of Texas, could easily support 40,000,000; so that it can be seen at a glance that Siam, although an old country, is young in development. It is larger than Japan proper or Korea, and has far greater wealth and resources than the latter. The physical conformation is remarkable. Not only are there large valleys watered by wide rivers and numberless canals, but fertile uplands, forests of teak and other valuable woods, and rolling hills where gold, sapphires and rubies, tin and coal are mined.

Siam is located in southeastern Asia, between the French possessions of Indo-China on the east and Burma on the west, with the Malay Peninsula to the southwest. Most of its area lies between the fourth and twenty-first degrees of north latitude, so that it is essentially a tropical land. Directly to the south is the Gulf of Siam, which opens into the China Sea.

Bangkok, the capital, is one of the largest and most important cities of Asia. Its population is estimated from 600,000 to 800,000 and is growing rapidly. Although hot and dirty, it is more progressive than most of its northern neighbors. It has an excellent electric street-car system, electric lights in the leading streets, telephones and telegraphs, railroads, hotels, clubs, libraries and banks; while the River Menam, flowing through its heart, is lined with godowns, offices, and wharves of exporting, importing and general shipping firms, as well as with the numerous rice and saw-

mills of Chinese and European companies. This same river provides an ideal harbor, with abundance of water for all ships that can cross the bar. Seldom are less than a dozen steamers loading and unloading at a time. A fleet of not less than five hundred steam launches plies on the waters, and thousands of smaller craft help to make a scene of activity that lasts from early morning until late at night. There are few ports, even in Europe or America, that have a busier appearance; and the heat of the tropical sun seems to have little effect.—Consular Reports, May, 1898.

REVIEWS.

- 1. Africa, Its Geography, Resources, Commerce and Chronicle of Discovery. 2d Ed. Price 4d.
- 2. The British Colonies and Dependencies, Their Resources and Commerce; with Chapters on the Interchange of Productions and Climatic Conditions. Price 6d.
- 3. Australasia, Its Geography, Resources, Commerce and Chronicle of Discovery. Price, 6d. London, A. M. Holden, 1897.

These books are prepared by M. J. C. Meiklejohn, B.A., for Professor Meiklejohn's series of text-books. Professor Meiklejohn is Professor of Education at St. Andrews University, Scotland, and one naturally expects that books issued in his name will be of educational value and high quality in regard to both selection and presentation of matter. We cannot say that these books impress us as being in any way distinguished from the general run of modern geographical text-books. They contain, of course, the usual information regarding the districts they treat, but this information receives no distinctive treatment, nor is it so presented as to call for any intellectual effort on the part of the student, beyond that involved in assimilating what is applied. There is no appeal to reasoning power, or to any geographical principles, nor is there good treatment of orography or physical geography.

As a frontispiece to the "Africa" we find a map that contains several serious misleadings. Thus (1) the Albert Lake is nearly as large as the Victoria, and considerably larger than Nyassa; (2)

Nyassa and Tanganyika have no outlets; (3) the hill does not approach within 100 miles of the Albert Lake, from which, however, it receives a tributary. Such a map, standing at the very opening of the book, makes one pause, and we think that few teachers will care to allow their pupils access to it. Even in the text no connection is established between Tanganyika and the Congo. It is to be regretted that the book should be allowed by its nominal editor to be so marred, and this, too, in its second edition.

In the "British Colonies" we find no mention of the railway to Buluwayo and its proposed extension; the only town that receives detailed description is the not very important one of Zanzibar, about which a paragraph is quoted from Reclus; it is said that the plain of the Ganges stretches from Assam to the Sulaiman Mountains; the map of New Zealand is very small, about two inches square, and has neither latitudes nor longitudes nor scale; in the map of Australia several towns are indicated by their initial, but are not referred to in the text. We find the same map in the "Australasia" volume, but here these towns are spoken of. This third book contains a much more detailed account of its region than there is room for in the other books.

Throughout these books we find considerable confusion in the use of the terms England, Great Britain and Britain.

The errors here noted, and some few others, might easily be corrected by more careful revision; but even then the books would remain simply stores of information, useful to those unfortunates who have to "prepare for geographical examination;" they would not have that educational character that teachers are learning more and more to demand in modern school books.

EDINBURGH ACADEMY.

C. G. C.

Physiography for Advanced Students. By A. T. Simmons, B.Sc., London, Macmillan & Company. 1897. Pp. viii, 483.

This book is not an advanced physiography in the ordinary sense of the term, but a handbook for students preparing for what the English Science and Art Department call physiography, which would be more accurately described as an introduction to the physical sciences. Indeed, more than one-third of this book is devoted to astronomy, and exactly one-third to physiography proper.

Even from the point of view of an introduction to the physical sciences, the choice and arrangement of matter is open to criticism.

Except for these limitations the book is an admirable one. The ideas are clearly and precisely expressed, and well-arranged within the different chapters. The teacher of geography will find it a very handy, accurate and up-to-date reference book, especially for the physical principles on which his physiography-teaching must be based.

There are one or two amendments which should be introduced in future editions. (1) The arrangement of wet bulb and water reservoir on p. 103 is the worst possible; (2) sulphuric acid is better than calcium chloride for gravimetric determinations of water vapor; (3) VAF is misprinted for VFA on p. 243; (4) it is doubtful if the direction of cracks is a sure guide to the angle of emergence; (5) the map on p. 130 is rather out of date; (6) the maps are said to be taken from Tarr's Elementary Physical Geography, but it would have been more courteous to have followed Professor Tarr's example and acknowledged the real sources of the maps.

A. J. H.

CURRENT LITERATURE.

- Geographical Journal, London. August. Sir John Murray, On the Annual Range of Temperatures in the Surface Waters of the Ocean, and its Relation to Other Oceanographical Phenomena; Sir W. Martin Conway, An Exploration in 1897 of Some of the Glaciers of Spitsbergen; Capt. A. W. Stiffe, Persian Gulf Notes; Areas of North American and Australian River Basins.
- Geographische Zeitschrift, Leipzig. August. Zimmermann, The Ending of Spanish Colonial Riches; Muller, The Importance of Geological Sections in Intermediate Geography Teaching.
- National Geographic Magazine, Washington. August. Mc-Gee, Papagueria.
- Scottish Geographical Magazine, Edinburgh. August. Christy, Rockall; Recent Hydrographic Research in the North and Baltic Seas.

ASTOR, LENOX AND TILDEN FOUNDATIONS.

THE

JOURNAL OF SCHOOL GEOGRAPHY

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Mss. intended for publication, books, etc., intended for review, and all correspondence, except concerning subscriptions, should be sent to the responsible editor, Richard E. Dodge, Teachers College, 120th Street West, New York City.

A SUGGESTIVE COURSE IN GEOGRAPHY.

Geography is the science of man's relation to his earth environment. Its subject-matter grows out of the mutual dependence of man and nature upon one another. These relations are subject to natural law, and are evolved according to the principle of cause and effect.

The mind of the child grows by properly directed mental activity. The highest aim of the teacher is to lead the young mind to be self-directive. Therefore the essential elements of geographical knowledge should be so arranged that in becoming master of it the student will have a decided impetus toward independent investigation.

With this in view geography may be resolved into the following lines of development:

- 1. From surface to continent.
- 2. From continent to the globe.
- 3. From soil to vegetation.
- 4. From vegetation to animal life.
- 5. From plants and animals to industries.
- 6. From industries to commerce.
- 7. From commerce to history.

These lines of thought, while each is complete in itself, are not independent, but react upon and reinforce each other at every

point of contact. Each line reaches down into the child's past life and classifies his previous knowledge. By observation, experiment and reflection, he is then led along these lines of development, thus enlarging his horizon and strengthening his mental power.

The following is a course of study based upon the foregoing principles. It is intended to be suggestive to those desiring to make geography a study of nature and man.

FIRST GRADE.

During the first grade the teacher should prepare for geography by bringing in, as supplementary work, the study of form and color from natural objects. Colored paper should be used to teach close observation of the form of objects.

SECOND GRADE.

Children collect flowers of all shades of color and group them according to color. In the autumn, when the leaves change color, hundreds of them may be collected, the various shades of color observed and the form drawn. This should be done during the first half of the term.

The second half of the year may be devoted to mapping the room and locating things in the room according to a definite scale of measurement. Measure the side of the room with a yard stick or a foot rule, establish a scale and draw a line representing it. Then proceed with the other sides and represent the whole floor in like manner.

The principal objects in the room should be located by measuring to them from the sides and reducing the position to scale and putting it on map. Map also the side of the house to scale showing the windows. (This will be a vertical section of the room.)

In connection with this work the children should observe the sunrise and sunset, the horizon and stars. Develop the explanation of this and teach the shape of the earth by the use of the globe. Do not attempt to prove it, but give it as a fact.

THIRD GRADE.

In the third year the oral work continues, no book being neces-

sary until the fourth year. The general outline of the work briefly stated is as follows:

Mapping.—At the beginning of the year a brief review of the work of the previous year should be made, and the work of mapping should extend to the yard, which should be measured with tape line or yard stick.

Field Work.—The principal geographical units should be studied and mapped.

1. Surface. A series of two or three lessons should be given:
(1) on the yard to show vegetation covered surface; (2) on the street or road to show barren surface; (3) on the contact between yard and street or road to show the structure of surface.

Horizontal maps and sections should be made by pupil. This gives an idea of the different kinds of surface.

2. Hill. A series of two or more lessons: (1) on summit, slopes and base of hill; (2) on the mapping of hill and showing elevation by contour—one or two lines to show general curves.

This gives an idea of the unit of elevation and forms a basis for the study of all relief forms.

3. Streams. A series of two or more lessons: (1) on the three slopes of the stream and the cutting power of water; (2) on deposition along the sides and at the mouth of the stream; (3) on mapping the stream to contour lines as before. This forms a basis for the study of all river systems.

Room Work.—The room work should consist of lessons on plants and animals, stories and compositions.

- 1. Plants. (1) A series of lessons on about ten common domestic plants, as wheat, corn, oats, rye, barley, grass, clover, etc.; (2) a series of lessons on about five fruits, such as apple, peach, berries, etc., with p ants.
- 2. Animals. (1) A series of lessons on about ten domestic animals, such as dog, cat, horse, cow, chicken, etc.; (2) a series of lessons on about ten burrowing animals, such as ant, mole, crayfish, gopher, earthworm, etc.; (3) a series of lessons on about ten wild animals, as wolf, bear, snake, crow, thrush, etc.

Note.—A lesson on any of the foregoing subjects should include systematic observation on the object itself which should take one or two days, then a composition on the object. This may be followed by a story or stories about the plant or animal, its use, etc. The study of plants should alternate with that of animals.

- 3. Stories. A series of stories bearing on the observational work should be selected and given in order to furnish additional information and to emphasize the principal points. The stories should always be in harmony with the work in progress.
- 4. Compositions. These should follow every development lesson and every story. By questioning, the teacher may get pupil to give an oral composition, and afterwards it should be written. The child in this way becomes master of English by using it.

Records.—In this grade the pupil should begin to keep records as follows:

- 1. Clear, cloudy, and rainy or snowy days.
- 2. Temperature—cold or warm—of each day.
- 3. Dew or frost.
- 4. In autumn, the turning of the leaves and the dropping of the fruit.
- 5. In spring, the budding of the trees and shrubs, and the blossoming of the plants.
 - 6. Finding of stones and observing their peculiarities.
 - 7. Air currents, etc.

About once each week a lesson may be given on these observations and whatever is of particular bearing may be memorized.

FOURTH GRADE.

Review.—At the beginning of this year's work about two weeks should be spent in review of the principal points developed in the third grade. This should include the study and mapping of the room, the surface, hill and stream. The field work need not be done again, but maps should be thoroughly studied.

Mapping.—Extend the mapping to the principal streets of the town, or to the principal roads of the neighborhood. Make a map of the neighborhood, locating principal houses. After extending the limit of the map to the range of the knowledge of the pupils, map the county, locating towns, railroads, school districts, principal streams and other points of special importance. Divide the county into municipal townships.

Weather .- A series of ten or more lessons on atmosphere to

show: 1. The nature of atmosphere. 2. The nature and causes of winds. 3. Evaporation, cloud formation and rainfall. 4. The effect of temperature. 5. The effect of location on temperature. 6. Clouds.

Animals and Plants.—This study continued. Useful wild and domestic animals and plants of the various countries should be studied. Give a series of lessons on harmful insects.

Transportation.—A series of about forty lessons on methods of transportation: 1. Simple contrivances, as wheelbarrow, cart, bicycle, wagon. 2. Raft, canoe, sailboat. 3. Street car, electric car, locomotive, passenger trains, freight trains. 4. Steamboats, sailships, steamships.

Industries and Trade.—A series of about ten lessons on the principal productions as industries: 1. Corn—the preparing of soil, the planting, cultivation, harvesting, transporting, marketing and uses. 2. Wheat in same way as corn. 3. Grass, rye, oats, potatoes, etc., in the same way.

Field Work.—After the review of the field work of the third grade there should be given a series of two or three lessons on coast-line:

- 1. Structure of coast-line, irregularities of land and water.
- 2. Islands, bays, capes and peninsulas.
- 3. Contour map of coast-line. This work should be done in October or November.

The Continent.—A series of about twenty lessons combining field work in the third and fourth grades to develop continent of North America:

- 1. Map plains, mountains, streams and localities showing actual relations.
- 2. Draw map of North America according to some system of map drawing.
 - 3. Draw contour lines locating highlands and lowlands.
 - 4. Locate principal river systems.
 - 5. Establish climatic zones by isotherms.
 - 6. Locate cities in plant zones.
 - 7. Locate principal productions in each zone.
- 8. A brief history of each government with special reference to development of boundary lines.

The lessons on weather, transportation and industries should be interspersed with these lessons on continent, but the last lessons on continent should not be given before February 1st.

Books of Travel and Stories.—These should be in constant use and should be selected with reference to the work in hand. Stories of Industry, published by the Educational Publishing Co., of Chicago; Jane Andrews' Stories, by D. C. Heath & Co., and Frye's Elementary Geography, are recommended. In addition to this, many valuable articles and pictures may be gathered from the newspapers and magazines of the day.

Compositions.—A composition should be written after every development lesson and after every story, according to suggestions for composition in second grade. Imaginary journeys should be taken and descriptions of people, productions and industries should be made.

Records.—During this year pupils should keep records of:

- 1. Weather, cloudiness, rainfall and temperature.
- 2. Changes of seasons, facts and causes.
- 3. Dew and frost, effects on vegetation.
- 4. First appearance of flowers and buds of trees, and the falling of leaves and ripening of fruits.
 - 5. Changes of wind and in what order winds follow each other.
- 6. Migration of birds, appearance and disappearance of insects, particularly grasshoppers and butterflies. Once each week or oftener drills and compositions should be had on these observations.

FIFTH GRADE.

Review.—Review briefly the lessons on map of country, weather, transportation, industries, and drill on map of North America.

Mapping.—Extend the mapping to the States, locating contour lines of elevation, streams and cities. Study soil, productions, industries and people. This may be used as a means of comparison in subsequent study.

Field Work.—In this grade the field work done in the third grade should be reviewed and its scope extended.

- 1. Stream: A series of lessons on the stream to study:
- (a) The cutting power of water on the three slopes of the stream and its methods of transportation.

- (b) The formation of rapids, waterfalls, lakes, and the deposition of material forming curves, flood plains and deltas.
- (c) The formation of a complicated stream system by the adjustment of numerous slopes.
 - (d) The processes of growth and recession of watersheds.
 - (e) The plant production of various parts of basin.
 - (f) A detailed contour map of stream system.
 - 2. The Coast Line: A series of lessons to show:
- (a) The action of waves in the production of irregularity of coast line.
 - (b) The formation of islands, estuaries and coastal plains.
 - (c) A contour map showing in full the irregularities.

With these lessons may be used numerous pictures of streams showing deltas, flood plains, waterfalls, etc. Also pictures of coast lines showing different kinds of cliffs, beaches, and the action of waves on cliffs.

Continents.—

- 1. After the work on the coast line, study the coast line of the Atlantic ocean, extending the study southward to South America, mapping it roughly at first, then according to a system.
 - 2. Work out the physical features by contour lines.
 - 3. Locate the river systems.
- 4. Establish climatic zones by isothermal lines and locate native and cultivated plants.
 - 5. Locate principal cities and study their people.
 - 6. Locate principal productions in each zone.
- 7. Locate boundary lines and study a brief history of each government.

From study of America take up coast line of Europe, Asia and Africa, including all in one map.

- 1. Estimate coast line.
- 2. Draw according to some system of map drawing.
- 3. By contour lines locate the relief forms.

Proceed as before until the zones, the productions and other features are developed.

Plants and Animals.—Study by stories and pictures, and by examples as far as possible, the tropical animals and plants of each zone of each country studied. This will require twenty or thirty

lessons during the year. The industries arising from animals and plants studied should receive special attention.

Commerce.—Domestic and foreign commerce, together with methods of transportation, should be considered with the study of the continent.

Atmosphere and Climate.—A series of lessons should be given near the beginning of the year on winds to develop the general circulation of the atmosphere and the direction of the winds in each zone. Study the relation of the winds and climate. Develop idea of cyclonic storms or atmospheric eddies.

Compositions.—Used frequently as before.

Records.—To be kept as before.

- 1. Weather, temperature, direction of wind, barometer, rainfall, dew and frost.
- 2. Plants and Animals: Last appearance in autumn and first appearance in spring, hibernation, migration. All new species found should be studied and named.

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(To be concluded.)

THE SOCIAL FUNCTION OF GEOGRAPHY.

The paper which follows below, by the Editor, was given in discussion of a paper by Dr. Spencer Trotter, of Swarthmore College, before the Washington meeting of the National Herbart Society. Dr. Trotter's paper had previously been published, together with a discussion by Professor Davis, in the Fourth Annual Year Book of the Herbart Society.

Dr. Trotter maintained in his paper the following theses:

- 1. There are two environments—the geographic and the social.
- 2. The value of geography as a school study lies in the contemplation of the interaction of the two environments.
- 3. The means for the pursuance of the study in this light is to be sought in the "type" idea.
- 4. The river basin, as a natural geographic unit, affords the most natural "type" for study. The contemplation of one river

basin as a type involves the consideration of other outlying river basins and intervening highlands. The geographic-social features of the entire land area (continental or insular) are thus broadly outlined by the several "types" and their relations.

- 5. The true method of teaching geography is in the clear and vivid presentation of the facts illustrating the interaction of the two environments in any "type."
- 6. The end in view of the study is to develop a social intelligence and, consequently, a social disposition; to break down local prejudice and to produce a broader spirit of sympathy and a tendency toward a more efficient cooperation.
- 7. The farthest-reaching effect produced will be the betterment of the social organism through the best possible development of its integral parts—the men and women as individual units of the whole.

Professor Davis in his discussion had particularly emphasized the need of a systematic scheme of geographic education and better trained teachers of geography. A few abstracts from his paper follow:

"While welcoming the emphasis that Professor Trotter gives to social and geographical environments, there are two other elements which I should like to consider in relation to the improvement of the position of geography in our educational programmes. The first is the invention of a scheme for the systematic development of the subject as a whole; the second is the better preparation of teachers.

"Systematic geography is a phrase that may, perhaps, receive condemnation from those biologists who regret the excess to which some systematists have carried the devices of classification in zoölogy and botany. The excess should certainly be avoided; but the systematic study of zoölogy and botany has contributed so greatly to the advance of these sciences that I strongly desire to see a similar method introduced in the study of geography. Until it is introduced I do not believe that geography will gain a high position in the scientific world. For example: to-day, in the absence of a recognized system of geography, no clear distinction is drawn between travelers and geographers. Geographical societies receive into their membership various persons who have no other claim to

such distinction than that they have been in remote countries, and have returned safely home with such items of information as their untrained skill enabled them to gather. This is not true of zoological and botanical societies; something more than general observation of plants is needed to make a person a zoologist or a No explorer would venture to report upon the flora or botanist. fauna of a region if his knowledge of plants and animals were no greater than that minimum received during his boyhood in school; but the pages of geographical journals are constantly occupied by the reports of travelers who have given no attention to systematic geography since their school days, and who then were taught in such a way that they learned little more than places and boundaries. This condition of things is extremely suggestive of the position held by geography among the sciences. I would not lessen by a single page the contributions made to geographical literature by those strong, energetic, brave men who penetrate unknown regions and bring back to us who stay more quietly at home as much as they can remember of what they have seen; but I should like to look forward to the time when the successors of the explorers of to-day shall be better prepared to take advantage of their opportunities for observation in strange lands, so that their reports shall more completely represent what they have seen.

"Various lines of progress will lead to this end; but I believe that no single one will be so important as the gradual introduction and establishment of an acceptable system of thorough geographical study. The subject must not be dropped on leaving the lower schools; it must be cultivated in the high schools, colleges and universities. Not until thus recognized along the educational line will its elementary presentation contribute all that it should to young scholars.

"What I wish to say about the preparation of teachers does not so much concern the single subject of geography as it concerns the audience to which these pages are addressed. In recent years I have had considerable experience with school teachers, partly in general lectures to teachers in Boston and elsewhere; partly in my summer courses on geography at Harvard, where the class is composed almost exclusively of teachers and superintendents. The fact that has impressed me most forcibly in this experience is the

utter disproportion between the mental equipment, on the one hand, and the capacity of both the teachers themselves and their scholars, on the other hand. Many of the most elementary principles regarding man's condition as an occupant of the earth, many of the most simple devices by which observational methods in geography may be advanced, seem to strike these teachers as novelties. cannot be because the teachers represent the ill-informed division of their profession, for those I have met are distinctly among the better informed. It is simply because they have not been well taught. It is time that this national association called a halt in a method that results in the appointment of poorly prepared teachers. It is time that the teachers themselves, on learning of their deficiencies, should protest that their successors shall be better equipped than they are themselves. While it remains as easy to satisfy the requirements of school boards regarding geography as it is to-day we cannot expect that students intending to be teachers will give much of their time to a subject that is discounted by their future employers. A few of the more serious and earnest students may, at their own risk, decide to prepare themselves adequately for the presentation of a great subject; but the great mass of the future teachers of geography will not be much better prepared as long as superintendents demand so little from them. Frequent inquiries reach me from superintendents and others regarding Harvard and Radcliffe students competent to teach geography; and it is generally necessary to answer that our students feel so little need of making special preparation in geography that very few of them have given it the attention that deserves commendation, and the majority of the few who have reached a commendable stage are looking for some other occupation than teaching geography. inquiring superintendent, then, perhaps, somewhat disappointed, decides that he must appoint the 'best candidate he can find;' and so the habit of accepting the services of an insufficiently prepared teacher is confirmed. It would promote progress if a superintendent should say: 'I will temporarily appoint the best person I can find; and, in the meantime, will announce that in one or two years I will select for a permanent teacher one who has made serious preparation for teaching geography.' I believe that this is a practicable scheme, and that it would soon lead to perceptible

improvement if it were strongly advocated by a body so representative and influential as the national association."

DISCUSSION.

In the brief time allowed me to discuss Dr. Trotter's paper it will be impossible to consider any points at length. I shall, therefore, limit myself to a few suggestions, following the order of the theses laid down by the author.

Geography has well been defined as the study of the earth in its relation to man, and has been considered both by geographers and historians as the "physical basis of history." There is every reason, therefore, to acknowledge the social side of geography now, when history is making, and to recognize the truth of Thesis 1. Argument thereon would be superfluous and a waste of time.

Our task, then, as teachers and teachers of teachers, is to see that our work in geography is so planned as to present the two sides of the work in their proper and logical proportions, and so executed that the subject may be as mind opening, broadening and helpful as by rights it should be. Dr. Trotter has well said in his paper, "Geography must present the conditions enforced by the earth on human life and progress." Not only must they be presented, they must be emphasized and made the most important feature of our geography work, if the subject is to attain a reputation for giving mental discipline and power that shall place it on an equal footing with mathematics and history.

My only feeling, however, is that we not only should bring out the casual relations between the earth and human conditions, but that we should also show the control that the geographic features exert upon animals and plants, particularly in reference to their distribution, manner of life, food, peculiar habits, etc. The study of animals and plants in this manner enables one to emphasize the influences of environment much more forcibly than when the human relations alone are considered. This for the reason that the generations pass more quickly in most animals and plants, and the teacher can thus use the accumulated experiences of his own study and observation for illustrations. Again, such a study leads the pupils to be broader minded, more sympathetically in touch with nature, and more fully conscious of the broad influence of law and the inexorable succession of cause and effect.

The value of geography teaching as a school study lies in the acquiring of a working knowledge of the fundamental principles of geography that determine organic distribution and progress, and an appreciation of the interaction of world forces and their influence on human life. This is a version of Thesis 2 that seems to me preferable.

How can such a desired knowledge of geographic principles be attained? Not by analyzing completely and minutely the complex facts of every region that is taken up for study, but by taking type regions in accordance with Thesis 3.

In this question of what should be used as a type and made the basis for work I should disagree with Dr. Trotter and not wholly agree with Professor Davis. As a type it is not necessarily the first case that presents itself, but the case that best presents the most essential principles in their normal relations; the choice of types is not a question of chance, but of discretion. In the earlier years, when elementary conceptions are to be gained, the home locality should be the type, to which all other localities are to be referred by contrast or similarity, and with whose conditions other conditions are to be measured. The home locality should early be studied as to altitude and slopes, so as to bring out a knowledge of drainage, for the drainage is the key to the geographic conditions. It is essential, however, that the home geography should not be continued too long as a basis for other work. It is very easy to carry a good thing to extremes, and to continue to harp back to early experiences and information long after such a retrospect has continued to bring out anything stimulating.

In later years some ideal continent may well be employed as a type. An ideal continent is best because no one continent is so situated or so isolated as best to illustrate the fundamental conceptions. This continent should first be considered in reference to its position on a body rotating at an angle of $23\frac{1}{2}^{\circ}$ with its plane of orbit, so that pupils may gain a knowledge of the essential features of its climate. Later on this continent should be studied in detail according to possible varieties in extension and direction of highlands and lowlands, as to altitude, climate, land forms, drainage, etc. Gradually the conditions may be added so that the ideal and the actual are the same. The ideal continent has been used with ex-

cellent results by Mr. Lyde, of Glasgow Academy, Scotland, and by Miss Hotchkiss, of the Teachers College, of Columbia University, New York City. To use, as Dr. Trotter suggests, the Hudson or any other large river of the Atlantic Slope as a type allows the teacher to overlook the vital point of relation of rivers to Appalachian oldland, and the historical, economic and social significance thereof.

In reference to Thesis 5 it seems to me that the true method of teaching geography is in analyzing the facts presented by the geographic environment, so as to discover the elements of the geographic conditions. This is all pupils can be asked to retain, and a working knowledge is better than a parrot-like memory of facts, encyclopedic in quantity.

As working principles of constantly increasing complexity and importance are evolved they should be first applied prophetically to later continents and areas. The pupils should first prophesy what geographic conditions may be excepted, and then seek the actual conditions. Such a method, rationally followed, gives scientific training in the three essential steps of observation, inference and proof, and gives the very best of mental discipline. I have known pupils of eight and nine years of age to use the prophetic method with extreme accuracy and success, even beyond the greatest expectations of their teachers. It should be said, perhaps, that this was done by teachers not especially trained in geography and that the success may be expected to increase with each year's experience.

The end in view (Thesis 6) is to develop a social intelligence and disposition based on a knowledge of human and geographic conditions the world over, to make our coming men and women better able, because of their geographic knowledge, to cope with the conditions of life, and better by training and nature. For a careful statement of what a know edge of geography means to men, and how such a knowledge may be made of great value in personal and in national affairs, one should read Dr. J. Scott Keltie's Applied Geography.

Thesis 7 is satisfactory, but geography cannot be considered all powerful in bettering society, though it can help.

These are some of the effects for which we must strive if we are

to make our geography work rational, interesting and usable. How are such ends to be gained, and what is necessary to secure the greatest possible advance at once?

The greatest need, as every school principal knows, is better trained teachers. They should be trained in geography and sociology, each as a science and each separately. The two subjects cannot be combined in the earlier stages of progress. Only when a good knowledge of both subjects is at ready command can one freely make use of their interrelations. Our best books treating of the influence of the environment on man have been written by those who have studied the geography and the social conditions separately, and combined them only when they had arrived at what might be called the ethics of the subject. As an illustration of books that bring out in the best way the social side of geography I will mention Geikie's Scenery of Scotland, George Adam Smith's Geography of Palestine and Shaler's Nature and Man in America.

The second essential is better organization of geography work of all grades, from kindergarten to university. On this point I would emphasize and endorse all that Professor Davis has said. Not until the place of school geography in the complete scheme of geographic education is known and essentially agreed upon can we expect to have systematic and valuable work in one of the middle stages of the scheme.

The third need is better books and better use of them. Books, such as I have mentioned, and others, of which Trotter's New Geography, Shaler's Story of Our Continent and Dryer's Indiana are good examples, are all of great value as showing the social side of geography. These represent the kind of books that are needed for all parts of this and other countries. Such articles as those by Miss Ellen C. Semple on The Influence of the Appalachian Barrier upon Colonial History, and The Geographic Causes Determining the Location of Cities, in the JOURNAL OF SCHOOL GEOGRAPHY, February and October, 1897, emphasize the side of geography that is the basis of this discussion, and are extremely valuable as showing the relation of geography to history and life. Here is a field in which geographers can by their writings greatly assist the common school teachers.

Finally, we need more geographers, and to eliminate from the minds of school principals and superintendents the idea, that is well-nigh universal, that any one can teach geography. When we have live teachers geography will become a live subject in the curriculum, and the social side of geography will receive its proper attention almost spontaneously.

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THE SPELLING OF SOME COMMON GEOGRAPHICAL NAMES.

The following selected decisions from the reports of the United States Board of Geographic Names are here given, believing them to be helpful. The Board in question decides the spelling of all questioned geographic names submitted to them by Government officers, and their decisions are adopted on all Government maps and publications. The principles followed by the Board are in general the same as given in this JOURNAL, March, 1898, p. 81, et. seq.:

Albert Nyanza: lake in central Africa. (Not Albert Edward, Albert Edward Nyanza, Muta, Muta Nzige nor M'Wooten N'zige.)

Allegheny: mountains and river in Eastern United States. (Not Allegany nor Alleghany.)

Amur: province and river in Eastern Siberia. (Not Amoor, Amour, Maugu or Sakhalin.)

Argentina: a republic of South America. (Not Argentine Republic.)

Assiniboia: a district of Canada. (Not Assinniboia.)

Astrakhan: city and government, Russia. (Not Astrachan.)

Azof: sea, Russia. (Not Azoff, Azoph, nor Azov.)

Baffin; bay and islands in Arctic America. (Not Baffin's.)

Bangkok; city, capital of Siam. (Not Bankok.)

Bokhara: city and country of Turkestan, Central Asia. (Not Bochara, Boukara, Buchara, Buchara, Bukhara, not Oozbekistan.)

Bosphorus: strait, between Black Sea and Sea of Marmora, Europe. (Not Boghaz, Bosporus, nor Strait of Constantinople.)

Brahmaputra: river, India. (Not Brahmapootra nor Burrampooter.)

Breslau: capital of Silesia, Prussia. (Not Breslou nor Breslaw.)

Bukharest: city, capital of Roumania. (Not Bucharest, Bukhorest, Bookaresht, nor Bukarest.)

Buzzards: bay, Mass. (Not Buzzard's.)

Caribbean: sea between North and South America. (Not Carribbean.)

Christiania: capital city and flord, Norway. (Not Kristiania.)

Dekkan: the Central Region of Southern India. (Not Deccan.)

Elburz: mountain in the Caucasus, southern Russia; highest mountain in Europe. (Not Elborus, Elbrooz, nor Elbruz.)

Erzgebirge: mountain chain between Bohemia and Saxony, Germany. (Not Erz, Erz-Gebirge, nor Erzegeberge.)

Faroe: a group of Danish islands north of Scotland. (Not Faro, nor Faeroe.)

Fujiyama: volcano, Japan. (Not Foosee, Fooseeyama, Fousi, Fuji, Fujigama, Fuji-no-yama, Fujino-yama, Fuji-san, Fuji-yama, Fusi, Fusino-yama, Fusiyama, nor Fusi-yama.)

Guadalupe: lagoon, land grant, P. O., R. R. station, and river in California. (Not Guadaloupe, Gaudalupe, nor Guadelupe.)

Hekla: volcano, Iceland. (Not Hecla.)

Hindu Kush: mountains, central Asia. (Not Hindoo-Coosh, Hindoo-Koosh, Hindoo Koosh, nor Hindo-Kush.)

Hoangho: river, China. (Not Hoang Ho, Hoang-Ho, Hwangho, Hwang-Ho, nor Hwang-ho.)

Hoosic: river in Massachusetts, New York, and Vermont, tributary to the Hudson. (Not Hoosac, Hoosack, nor Hoosick.)

Irkutsk: city and government, eastern Siberia. (Not Irkootsk, nor Irkoutsk.)

Iztaccihuatl: volcano, near the city of Mexico. (Not Istaccihuatl nor Ixtaccihuatl.)

Juan de Fuca: strait between Vancouver Island and Washington. (Not Fuca, San Juan de Fuca, nor Strait of Fuca.)

Karlsruhe: capital of Baden, Germany. (Not Carlsruhe.)

Karpathian: mountains of Austria-Hungary. (Not Carpathian.)

Khinghan: mountains between Manchuria and Mongolia, Asia. (Not Khingan, Khin Gan, Ghin-Gan, Khing-Gan-Oola, nor Khing-Gan-Oula.)

Kilauea: volcano, Hawaiian Islands. (Not Kilaua.)

Kilimanjaro: mountain in eastern Africa near the equator. (Not Kilima Njaro.)

Kootenai: lake in British Columbia and river in British Columbia and Montana. (Not Kootenie, Kootenay, nor Kootenie.)

Kuenlun: mountain range of central Asia. (Not Koolkoon, Kouen Lun, Kounkoun, Kuen Lun, Kwan lun, Kwen Lun, nor Kwun lun.)

Kuril: islands between Japan and Kamchatka, North Pacific Ocean. (Not Chishima, Kooril, Kouril, nor Kurile.)

La Guaira: seaport of Venezuela, South America. (Not La Guayra.)

Maggiore: lake in northern Italy. (Not Lac Majeur, Lago Maggiore, nor Lake of Locarno.)

Mainz: city, Germany. (Not Mayence.)

Malakka: city, settlement and strait, Malay peninsula. (Not Malacca, Malaya, nor Naning.)

Manchuria: grand division of the Chinese Empire. (Not Manchooria, Mandchouria, Mantchooria, Mantchuria, Mandshooria, Shingking, nor Tungsansheng.)

Maracaibo: city, gulf and lake, Venezuela. (Not Maracaybo.) Mekka: city, Arabia. (Not Mecca nor Mekkeh.)

Miquelon: islands off south coast of Newfoundland. (Not Langlade, Langley, nor St. Pierre and Miquelon.)

Mozambique: channel, city and territory, eastern Africa. (Not Mosambique.)

Neuchatel: canton, lake and town, Switzerland. (Not Neuenburg nor Neufchatel.)

Nizhni Novgorod: city and government, central Russia. (Not Nijni, Nijnii, Nijniy, Nischnii, Nizhnee, nor Novogorod.)

Oaxaca: capital city and state, southern Mexico. (Not Guaxaca nor Oajaca.)

Pamir: table land of central Asia. (Not Bam-i-duniah, Pameer, Pamere, nor Pamirs.)

Puy de Dome: department and mountain, central France. (Not ny-de-Dôme.)

Rangoon: maritime district, river and seaport of British Burma, India. (Not Rangoun nor Rangun.)

Rhine: river, Europe. (Not Rhein nor Rhin.)

Rio Negro: river in Brazil, tributary to the Amazon. (Not Guainia nor Parana.)

Riu Kiu: group of islands off the Chinese coast, Pacific Ocean.
(Not Lieou-Khieou, Liu Kiu, Liukiu, Loo Choo, nor Riukiu.)

Roumania: country, southern Europe. (Not Romania nor Rumania.)

Santo Domingo: a West India republic on the island of Haiti. (Not Dominica, Dominican Republic, Saint Domingo, nor San Domingo.)

Singapore: city and settlement, Malay peninsula. (Not Sincapore nor Singapoor.)

Skagerrack: an arm of the North Sea between Denmark and Norway. (Not Skagerack, Skager-Rack, nor Skager Rak.)

Sudan: region of central Africa. (Not Soodan, Beled-es-Sudan, Nigritia, Beled-es-Sooden, nor Soudan.)

Tanganyika: great lake, central Africa. (Not Kimana, Msaga, Tanganika, nor Yemba.)

Thian Shan: mountains of central Asia. (Not Than Shan, Thian Shan, Tian Shan nor Tien-Shan.)

Tientsin: city and treaty port, northern China. (Not Tien-tsin, Tien Tsin nor Tientsinfu.

Tierra del Fuego: group of islands at south end of South America. (Not Terra del Fuego.)

Timbuktu: town, western Africa. (Not Ten Boctoo, Timbuctoo, Tombouctou, Tombuctoo, nor Tombuktu.

Tonkin: gulf and province, the northernmost of Anam, Indo China. (Not Tongking, Tonquin, nor Tungking.)

Transvaal: republic in South Africa. (Not South African Republic.)

Trieste: city and gulf at the head of the Adriatic Sea. (Not Triest.)

Turkestan: great region in central Asia. (Not Toorkistan nor Turkistan.)

Willamette: river, northern Oregon. (Not Ouallamet, Wahlahmath, nor Williamette.)

Winnipegosis: lake in Manitoba and Saskatchewan, Canada. (Not Little Winnipeg, Winnipegoos, Winnipegoose, nor Winnepegoosis.)

Wurttemberg: kingdom, Germany. (Not Wirtemberg, Wurtemberg, nor Wurtemburg.)

Würzburg: city, Bavaria. (Not Würtzburg.)

Xingu: river, central Brazil, tributary to the Amazon. (Not Chingu.)

Yenisei: estuary and great river in Asiatic Russia. (Not Enisei, Jenisei, Jenisei, nor Jenisey.)

Zambezi; river, southeastern Africa. (Not Ambezi, Cuama, Luambezi, Molonko, Zambere, Zambesi, nor Zambeze.)

Zuider Zee: gulf, Netherlands. (Not Zuyder Zee.)

THE SELECTION OF TOPOGRAPHICAL MAPS FOR SCHOOLS.

St. James School, Washington Co., Md., April 29, 1898.

TO THE EDITOR, JOURNAL OF SCHOOL GEOGRAPHY:

Will you kindly tell me what topographical maps of those published by the United States Geological Survey you think useful for illustration and laboratory work in teaching elementary Physical Geography in the upper classes of a preparatory school?

Respectfully yours,

ALLAN ABBOTT.

The following reply has been sent to Mr. Abbott's question:

Inasmuch as elementary Physical Geography must be concerned chiefly with fundamental principles of world-wide application, and not with the mere description of local political divisions, it is important in selecting maps first to recognize the principles that are to be illustrated; and second to secure illustrations of the principles from the rich store of maps published by the Geological Survey. In view of the source of these illustrations, only that division of Physical Geography that deals with land forms is here considered.

I believe that the fundamental principle deserving first recognition is the control that land forms exert on the location of settlements, lines of movement or travel, and character of occupations of a people. Every map, whatever its other uses, should afford abundant illustrations of this principle; hence none need be specified under this heading.

Recognizing the importance of the physiographic control exerted by land forms on human conditions, it is reasonable to ask for a method by which land forms can be accurately and concisely de-Various methods might be suggested, but none stand the test of experience so well as that one which describes by giving explanation of origin. Hence the second fundamental principle is that land forms are what they are on account of the action of various natural processes of weathering and wearing. processes need illustration, not so much to call attention to the processes themselves as to use them as a means of describing the For this purpose the folio lately pubforms that they produce. lished by the Geological Survey, entitled Physiographic Types (to be reviewed next month), cannot be improved upon. sheets there included are to-day matchless in any other publication. The chief processes that they illustrate by their results are erosion under the attack of weather and water, rain and rivers, volcanic and glacial action, movements of elevation or depression and wave action. Constant care should be taken to bring the attention of pupils to the topographical forms exhibited on these maps, as well as to the processes by which the forms are accounted for. exercise is found in describing a given form in non-technical language before using its technical name.

A third fundamental principle is concerned with the amount of destructive work accomplished, as indicating the stage reached between its beginning and its end; this again serving not so much as a measure of past history as a means of easily describing present form. The folio above mentioned includes examples of young, mature and old forms that cannot be improved upon as means of emphasizing the elementary phases of this lesson.

A fourth principle, of great importance, but not so elementary as the others, is that which recognizes the control of external form by internal structure, as well as by action of process and by stage action. For example, regions of horizontal structure are dissected by irregular branching valleys; hence their hill-spurs branch with corresponding irregularity between the streams, as shown on the Charleston, W. Va., sheet. Regions of tilted structure determine an alignment of ridges and valleys; the harder strata resisting erosion and in time standing up in relief; the weaker structures being more easily consumed, and thus reduced to valleys and low-lands. The Lykens and Harrisburg, Pa., sheets offer wonderfully fine illustrations of this principle. For the teacher a geological folio, such as that of the Piedmont, W. Va., sheet, would be very serviceable in giving explanation of the rock structure to topographic form.

As it is not practicable to expand this explanatory statement very far, the following condensed list of maps is appended; but it should be borne in mind that if physical geography is to be treated in a thorough manner it must deal with principles first and with places afterwards in illustration of these principles, and that the more systematically the subject is treated the sooner it may take its deserved rank along with other sciences. Additional account of a number of these sheets may be found in a little book entitled "Governmental Maps for Use in Schools," by Davis, King and Collie (H. Holt & Co., New York, 1894). The method of ordering the maps has been explained in the JOURNAL for September, 1897.

Fargo, N. D.-Minn. A young plain.

Charleston, W. Va. A maturely dissected plateau.

Caldwell, Kan. An old, worn-down plain.

Palmyra, Va. An old, worn-down mountain range, now uplifted and again dissected; a rejuvenated region.

Mt. Shasta, Cal. A young volcano.

Eagle, Wis. A glacial moraine, with gravel plains and lakes.

Sun Prairie, Wis. Glacial hills or drumlins.

Donaldsonville, La. Flood plain of Mississippi River.

Boothbay, Me. A young ragged coast, produced by half-drowning a rugged land.

Atlantic City, N. J. A coastal plain fronted by off-shore sand-reefs, enclosing a marshy lagoon.

The above ten maps constitute the "physiographic types" of

the first folio of the "Topographic Atlas of the United States," above referred to.

Glassboro, N. J. A low coastal plain; valleys shallow because the land is low.

Marysville, Cal. A fluviatile or river-made plain, consisting of waste from the Sierra Nevada and Coast Range spread out by streams.

Marion, Ia. A plain of glacial drift; an important example to counteract the prevailing impression that glacial action is destructive. Here the ice sheet laid down much drift, forming a more even surface than existed in preglacial time.

Springfield, Mo. A dissected upland.

Fort Defiance, Ariz. An elevated plateau, not yet dissected by deep valleys, although standing high above baselevel; hence a young plateau.

Mesa de Maya, Colo. A dissected plateau; broad uplands divided by narrow canyons.

Kaibab, Ariz. The deepest part of the Colorado canyon, enclosed by plateaus but little dissected on either side.

Scottsboro, Ala. A coarse-textured dissected plateau; to be contrasted with Charleston, W. Va., where the texture of hill-spurs and stream-valleys is much finer.

Watrous and Corazon, N. Mex. Escarpments or cliffs, by which the surface of the plateau ascends to successively higher and higher levels, like a gigantic flight of steps.

Price River, Utah. A strong escarpment, deeply dissected by a labyrinth of valleys between intricately branching spurs.

Abilene, Tex. Remnant mesas, overlooking a worn-down plain. Tooele Valley, Utah. A mountain range rising from a desert plain; the plain consisting of waste washed down from the range and accumulating with smooth sloping surface in the adjacent troughs.

Livingston, Mont. A range trenched across by a transverse valley.

Mt. Mitchell, N. C. Subdued mountains; that is, mountains so long exposed to denudation that they have been reduced to generally graded slopes covered with rock waste; bare peaks, cliffs and ledges are relatively rare.

Chesterfield, Mass. The uplands of the Berkshire hills illustrating the rejuvenated worn-down mountains of southern New England. A good antidote to the erroneous idea that the "mountains" here consist of a single sharp ridge, as they have been represented.

Ellicott, Md. An old worn-down mountain region, rejuvenated. Harrisburg, Lykens, Pa. Long, narrow, even-crested Appalachian ridges in central Pennsylvania. Fine illustrations of broad longitudinal valleys and narrow transverse valleys.

Staunton, Va. Part of the great Appalachian valley.

Crater Lake, Ore. A superb caldera, produced by the engulfment of the upper part of the volcanic cone.

Marshall, Mo. A river meandering on its flood plain.

Versailles, Mo. A river in a narrow meandering valley.

West Point, N. Y. The gorge of the Hudson in the Highlands. Harpers Ferry, Va. A transverse gorge through the narrow northern part of the Blue Ridge.

Webster, Mass. Lakes of glacial origin, increased by the construction of artificial dams, in a hilly district.

St. Paul and Minneapolis, Minn. Contrast between the broad valley of the Minnesota, formed by the discharge of a great lake (Lake Agassiz) that existed during the latter part of the glacial period, and the narrow valley of the upper Mississippi.

Springfield, Mass, River terraces, common in the valleys of the northern glaciated States.

Wicomico, Md. A half-drowned maturely dissected coastal plain.

New London and Norwich, Conn. An estuary formed by the partial submergence, or drowning, of a river valley.

Marthas Vineyard, Mass. A smoothed shore line.

Kinsley, Kan. Sand dunes.

The value of these maps in teaching is greatly increased if groups of adjoining maps are employed, instead of single sheets. (See the JOURNAL, May, 1898, p. 177.) In that case the grouped sheets should be "backed" with cotton cloth and mounted on roller sticks at top and bottom. The cost of this arrangement is much greater than that of the maps themselves; but it greatly increases their durability and ease of use, as well as their effectiveness.

It should be understood that every well-equipped school should, as a matter of course, possess all the published sheets of its home Application to the Director of the U.S. Geological Survey, Washington, will secure a list of such maps free of charge; in many cases accompanied by an outline map of the State on which the location of the published sheets is shown. In certain States the publications of the local Geological Survey will be found useful. For example, in New Jersey, a valuable relief map was published a year or more ago, and a volume of the final report of the Survey. lately issued, treats of the physical geography of the State. Missouri an account of the physical features of the State has been issued by the State Survey. In Maryland the Survey newly established promises to devote special attention to the educational aspects of its work. Unfortunately, in many of the States no such care has been taken to inform the people about their surroundings.

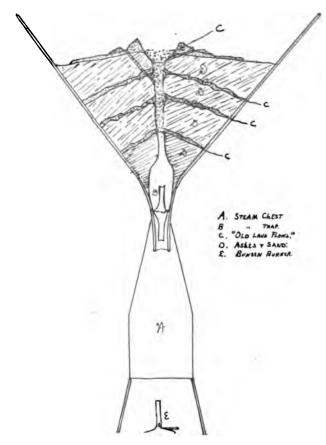
W. M. DAVIS.

HARVARD UNIVERSITY.

NOTES.

Model of a Volcano.—It may be of interest to teachers of physiography to know of a simple and cheap method of constructing a model of an active volcano. The model was devised to show a class of small boys how volcanic phenomena could be the result of the action of steam. It was a simple matter to generate the steam. A flask would do; but "App. A." of the Harvard Physical Course -a copper vessel with a cone-shaped top-was at hand, and so most convenient to use. Into the stem of this a large glass funnel was packed with cotton wicking. It was found after many failures that it was necessary to introduce a small glass steam trap into the bottom of the funnel. This prevented the steam from creeping up the sides of the funnel and made it work up through the center. Around this was packed sand and fine ashes in layers to represent strata. These layers were made to slope away from the center to represent the formation of an old cone. Some difficulty was found in getting material which would become just viscid enough to flow slowly at steam heat. Tar was too stiff; liquorice

dissolved. Finally, by mixing different paraffines, the right consistency was found. To give better effect this was colored with liquorice melted in it. Layers of this were alternated with ashes and sand. Unless sloping layers of paraffine are alternated, the steam will simply percolate through the whole and not be concen-



trated enough at one point to produce the effect of a volcano. When this apparatus is set at work by generating steam a miniature volcano is shown in action in certain respects. Lava rises in the center and flows down the slopes until cool; a mixed cone is formed of lava and ashes, which changes from time to time by bursting out in new places; "bombs" are thrown out and build up the cone. If the action is to be kept up, bits of paraffine

must be thrown into the vent. When the heat is turned off, the lava sinks in the crater. When cold the whole can be turned out on a board and a section made with a sharp warm knife which will show the structure of the volcano.

F. GARDINER, JR.

POMFRET SCHOOL, Pomfret, Conn.

Ocean Rainfall.—Hitherto no map showing the distribution of rainfall over the ocean has been available, but the teacher has had to picture it from maps depicting the average number of rainy days in the year, which was a difficult thing to do, as the rainy day includes twenty-four hours of equatorial downpour, as well as a like period of clouds with only a few showers. The quantity of rain must be determined by a gauge. This has been done on several ships, and Surgeon-General Black, of Edinburgh, has studied all such observations made on British ships, some of which have been equipped with a rain-gauge of his contriving. observations Dr. Black has calculated the mean rainfall per rainy day in different zones in the different oceans. (Journal of Manchester Geographical Society, 1898, XIV, pp. 36-56). To these Professor Supan has added returns from three other ships. He then arranges observations on the number of rainy days at sea (using only those of German sailors), in parallel zones, broken up into smaller areas by meridians 10°-30° apart. In each of these areas then we know the number of rainy days per year, and in the zone of which it is part, the mean rainfall per day. From this the mean annual rainfall of each area is calculated and then mapped. The data do not suffice for mapping more than the Atlantic and South Indian Oceans.

Dr. Supan's conclusions are as follows: (see Petermann's Mitteilungen, 1898, XLIV, pp. 179-182.)

In higher latitudes the land is drier than the sea, for more water vapor is produced and all through the year favorable conditions for condensation prevail. The rainiest region in high latitudes is over the North Atlantic, where the Gulf Drift gives off an exceptional quantity of water vapor.

Favorable evaporation and condensation conditions also prevail in the equatorial region, where rain falls over the oceans in greater abundance than any similarly located land region, except the

Amazon basin (and the Dutch East Indies). Owing to the monsoons, the rainfall is much broader in the Indian than in the Atlantic Ocean.

Between these rainy regions lie the tropical dry belts, expansions of which are seen over the Sahara and Kalahari and Central America. Here the land is not quite so wet as the ocean, for in summer the prevalence of the rainless trades is broken over the land, and also the trades are forced upwards on the windward side of the land and become rain givers. It seems as if the trades in the Indian Ocean were somewhat better than those in the Atlantic. More gauge records at sea are much needed.

A. J. H.

Climate of Cuba.—Climatologic records are not available, except for Habana, and these are not applicable to the whole island, where it is but natural to suppose that the altitudes and position of the high mountains produce great variations in precipitation and humidity, such as are observable in adjacent islands. The Sierra Maestra probably presents conditions of temperature very nearly the same as the Blue Mountains of Jamaica, where the thermometer at times falls almost to the freezing point.

Everywhere the rains are most abundant in summer, from May to October—the rainy season. As a rule, the rains brought by the trade winds are heavier and more frequent on the slopes of the eastern end. At Habana the annual rainfall is 40 inches, of which 28 inches fall in the wet season. This rainfall is not excessive, being no greater than that of our Eastern States. The air at this place is usually charged with 85 per cent. of moisture, which, under the tropical sun, largely induces the rich mantle of vegetation. The average number of rainy days in the year is 102. There is but one record of snow having fallen in Cuba, namely, in 1856.

At Habana, in July and August, the warmest months, the mean temperature is 82° Fah., fluctuating between a maximum of 88° and a minimum of 76°; in the cooler months of December and January the thermometer averages 72°, the maximum being 78°, the minimum 58°; the mean temperature of the year at Habana, on a mean of seven years, is 77°; but in the interior, at elevations of over 300 feet above the sea, the thermometer occasionally falls

to the freezing point in winter, hoar frost is not uncommon, and during north winds thin ice may form. The prevailing wind is the easterly trade breeze, but from November to February cool north winds (los nortes, or "northers")—the southern attenuation of our own cold waves—rarely lasting more than forty-eight hours, are experienced in the western portion of the island, to which they add a third seasonal change. From 10 to 12 o'clock are the hottest hours of the day; after noon a refreshing breeze (la virazon) sets in from the sea. In Santiago de Cuba the average is 80°; that of the hottest month is 84° and that of the coldest 73°.

The whole island is more or less subject to hurricanes, often of great ferocity. The hurricane of 1846 leveled nearly 2,000 houses in Habana and sunk or wrecked over 300 vessels. In 1896 the banana plantations of the east were similarly destroyed. Earthquakes are seldom felt in the western districts, but are frequent in the eastern.

All in all, the climate of Cuba is much more salubrious than it has been painted. The winter months are delightful—in fact, ideal—while the summer months are more endurable than in most of our own territory. The current impressions of insalubrity have arisen from an erroneous confusion of bad sanitation with the weather. While it is true that sickness follows the seasons, the former would be greatly allayed—almost abated—if public hygiene received proper official consideration.—Nat. Geog. Mag., May, 1898.

Some Notes Concerning Lima, Peru.—In Lima houses are usually of one story; the floor is of brick (sometimes of stone) and the walls of wood covered with clay. This kind of construction has been adopted as much on account of earthquakes as because of the cost of materials. Upon wooden uprights are nailed large bamboos, and a house in process of construction has the appearance of an immense cage. The bamboos are afterwards plastered with clay and form hollow walls about six inches thick. Houses are rarely built in any other manner, and I have seen the steeples of churches so constructed. The houses invariably have flat roofs, composed of planks covered with clayish earth about four inches thick. This earth absorbs the water; but when the

drizzling rain is more abundant or more persistent than usual, it happens that the water penetrates the roof and causes serious damage in the houses. In some few houses the roof is tiled.

Pitch pine, or a white wood called Oregon pine, is used in building. Both come from the United States. In some highly finished buildings oak and maple from the Sierras, woods which are very expensive in Lima, are used. For the wainscoting of fine buildings the cedar of Nicaragua is preferred. Almost all woods, except the cedar and the oak, are attacked by insects. When the advantage of metallic beams and corrugated sheet iron are appreciated doubtless the system at present followed will be abandoned. The belief is often expressed that the dampness of the climate will quickly destroy iron. This fear is absolutely chimerical, and is contradicted by the perfect preservation of iron bridges, light railings and other metallic constructions which have been in existence for a long time in Lima. Clay is very abundant in the vicinity of the capital and is of excellent quality. This does not, however, prevent bricks 50 by 100 by 210 millimeters (1.97 by 3.94 by 8.34 inches) from costing 25 soles (\$10.60) per thousand. baked bricks, or "adobes," which are 75 by 150 by 450 millimeters (2.95 by 5.9 by 17.7 inches) and which cost 30 soles (\$12.70) the thousand, are almost exclusively used for building. good quality costs at the present time 2 soles (84 cents) the cahiz (151 gallons).

Umbrellas are never used. Foreigners who carry them attract universal attention. Parasols, on the other hand, are much in favor.

The "poncho" is the national Peruvian garment for horseback riding. It is a plaid or striped shawl, of vivid colors, about 2½ yards long and 1¾ yards wide, with a slit in the middle for the passage of the head. Formerly it was made of silk and was expensive. To-day the taste for riding has decreased in the town, and those still addicted to this kind of sport have adopted the English costume. The poncho is now used only in the country and by travelers. For long trips it is undoubtedly useful. Many of wool, more or less fine, are manufactured in the country, so that importations do not reach a very high figure. Consular Reports July, 1898.

Brazil.—The United States of Brazil occupy, among the Republics of the world, in regard to extension of territory the second place, and in regard to population the third. In fact, before the acquisition of Alaska, which added 531,000 square miles to the 2,970,000 square miles which composed the area of the United States in 1868, the area of Brazil with its 3,209,878 square miles exceeded the area of the United States by 239,878 square miles. The area of Brazil is greater by 229,910 square miles than the European areas of the six great powers of Europe—Russia, Germany, Austria-Hungary, France, Great Britain and Italy. With their estimated 75,000,000 of population the United States rank first, France with its 38,517,975 comes second, and Brazil with its 16,500,000 third.

Developing a coast on the Atlantic of 4,000 miles and bordering on all the South American Republics except Chile, closing their northern boundary in the limits of the English, Dutch and French Guianas; served by a fluvial system of 50,000 miles of navigable waters, of which the Amazon and the Plata are the principal outlets; with diversified climates, lowlands and plateaus appropriate to the culture of all the products of the earth; stocked with minerals of all kinds, covered by immense forests of timber; producing already seven-tenths of the coffee of the world, and four-fifths of the rubber, the United States of Brazil, in their undeveloped condition, await only capital and immigration to repeat in the southern half of our continent the magic progress of the United States of America. Bull. of the Bureau of American Republics, October, 1897.

Mineral Resources of the Great Lakes Basin.—The various stores of what are termed mineral wealth in the Lake Region had but little importance to the Indians. Native copper was mined in a rude manner from natural outcrops; flint was obtained from loose boulders for arrow points and spear heads; ochres were used for paint; mica for personal decoration; clay was manufactured into rude pottery; and certain soft rocks were utilized for pipes. This brief catalogue could perhaps be slightly extended, but an exhaustive study would fail to show that the Aborigines had more than a slight knowledge of the marvellous mineral resources of

their broad domain. With the advance of civilization greater and greater demands have been made on the stores of material and energy accumulated in the earth's crust.

In the Lake Region the rocks, especially limestone, sandstone, granite and basalt, furnish an inexhaustible supply of building stone and road metal. Clays are abundant for the manufacture of all the coarser kinds of pottery and for tiles, bricks, etc. is known to exist, but has not been utilized. Extensive deposits of marl and clay are available for cement. Limestone and gypsum are largely employed in New York, Ohio and Michigan for lime and plaster. Hydraulic limestone is quarried on an extensive Salt occurs in vast quantities in New York, scale at Buffalo. Ontario and Michigan, and is the basis of a great industry; in 1894 the output was in the neighborhood of twelve million barrels. Chemical works near Detroit, with millions of dollars invested, are producing sodium carbonate. Phosphates for fertilizers are mined in the crystalline rocks of Canada, and the same terranes yield gold in considerable quantities, although small in amount in comparison with many other regions in America. Coal seams occur in the southern peninsula of Michigan, but, although giving promise of important development in the near future, now yield less than 100.000 tons a year. Gas and oil fields in Ontario and northwestern Ohio are well within the Laurentian basin. None of the industries based on the geological resources just mentioned, however, have reached the development of which they are capable. These sources of wealth may be said to be held in reserve for future generations.

The great industries which draw their raw materials from the geological resources of the Lake Region center about its vast iron and copper deposits.

The principal iron mines, not considering for the present the red ores of the Clinton rocks from New York westward to Wisconsin, or the much more important magnetite deposits of the crystalline rocks of New York, are the vast beds of hematite and magnetite on the south shore of Lake Superior, and similar but as yet undeveloped ores in adjacent portions of Canada.

The deposits of native copper on the south shore of Lake Superior have made Michigan not only the leading copper-producing

center in the United States, but given her a controlling voice in the copper markets of the world. With the copper occur minor quantities of native silver.

The production of both iron and copper has been increasing ever since their development began, and there is no evidence that the maximum has been reached. The supply seems to be regulated solely by the demand. The above statements may perhaps seem too sanguine, but I believe are fully sustained by statistics which show that the copper mines of Michigan produced 101,410,277 pounds of copper in 1890. The iron ores shipped from Michigan and Minnesota in 1895 amounted to 89,678,897 tons, or considerably more than one-half of the total production of the United States for the same year. Bull. Am. Geog. Soc., XXX, 3, 1898.

Colonial Possessions of European States.—The extent of the German colonial possessions and protectorates, including the recently leased territory in Kyao-chou Bay, is 2,600,000 square kilometers (1,615,577 square miles). The German Empire proper contains only 540,657 square kilometers (335,931 square miles), which is not much more than one-fifth of its colonial possessions. Togo, Kameroons and German Southwest Africa contain together, 874,189 square miles. German East Africa is nearly two-thirds as large as the last named, having 584,777 square miles.

England's colonies and possessions embrace no less than 16,-662,073 square miles, or more than eighty-five times as much as the Motherland.

A comparative table of the extent and number of inhabitants of the European colonial possessions shows:

Country.	Extent.		Population.	
	Moth'rl'nd.	Colonies.	Motherland.	Colonies.
Great Britain	Sq. miles. 120,979	Sq. miles. 16,662,073	39,825,000	322,000,000
France		2,505,000 1,615,577 809,914	38,520,000 53,325,000 5,050,000	44,290,000 7,450,000 10,215,000
HollandSpain		783,000 405,458	4,930,000 17,300,000	34,210,000 9,800,000
Italy Denmark (Faroe Islands, Iceland and Greenland)		242,420 86,614	31,290,000 2,175,000	195,000 130,000

Germany takes third place as regards extent of colonial territory, but only sixth in point of population of her possessions. Only Great Britain, France, Holland and Portugal have more inhabitants in their colonial possessions and protectorates than there are at home. Consular Reports, July, 1898.

Concessions in China.—China has granted to the British Government a lease for 99 years of the mainland Kau-lung, opposite Hongkong, as far as a line drawn from Deep Bay to Starling Inlet, Mirs Bay, as well as of Lan-tao and the other smaller islands lying off the coasts of Lan-tao, Hongkong and the mainland. Scot. Geog. Mag., July, 1898.

Firecrackers in China.—During the year ending June 30, 1897, there were exported from China 26,705,733 pounds of firecrackers, valued by the imperial customs at 1,993,082 haikan taels, equaling, at the average rate of exchange during that time, \$1,584,-151 in gold. The entire export was from the province of Kwangtung. The shipments from the different ports were as follows:

	Pounds.
Canton	1,067,20
Kowloon	24,074,26
Lappa	907,73
Swatow	656,53

Of the total shipment, by far the largest part were sent by sailing vessels to New York. A small quantity went to England. Other countries buy only infinitesimal amounts.

During that year freight to New York ranged from \$2.25 to \$4.25 per ton (40 cubic feet), varying with the rate of exchange and with the number of sailing vessels seeking cargo.

The exports represent only a small fraction of the amount manufactured and used in China. There are no large manufactories; the crackers are made in small houses and in the shops where they are sold. In the latter places the proprietor of the shop, his wife (or wives) and the children do the work. No record is kept of the number made and sold, and no estimate is possible of their cost. The use of crackers is universal in China, and has been as far back as history records. It is most probable

that in the beginning they were used to frighten away evil spirits. Now they are most frequently an expression of good feeling or of ceremonious compliment. They are used at weddings, births and funerals; at festivals; religious, civil and military ceremonies; at New Year; to salute persons about to make a journey; and, in fact, on all occasions out of the ordinary routine.

In making crackers, only the cheapest kind of straw paper which can be produced in the immediate locality where the crackers are made is used for the body of the cracker. A little finer paper is used for the wrapper. A piece of straw paper 9 by 30 inches will make twenty-one crackers 1½ inches long and ½ of an inch in diameter.

The powder is also of the cheapest grade, and is made in the locality where used. It costs 150 to 175 cash per catty, or 6 or 7 cents gold per pound.

For the fuse a paper (called "leather" in Shanghai) is used, which is imported from Japan and is made from the inner lining of the bamboo. In other places a fine rice paper is used, generally stiffened with buckwheat flour paste, which, the Chinese say, adds to its inflammability. A strip of this paper \(\frac{1}{2}\) of an inch wide by 14 inches (a Chinese foot) long is laid on a table, and a very little powder put down the middle of it with a hollow bamboo stick. A quick twist of the paper makes the fuse ready for use. Consular Reports, July, 1898.

Life on the Gold Coast.—To the north of the Gulf of Guinea, in the west of Africa, is a narrow strip of low-lying land skirting the ocean. Low, wet and marshy, in some places heavily wooded with large trees, and lying under a tropical sun, its climate is unhealthful, in some localities even deadly. Fevers prevail among the white settlers, and in the wet season rheumatism and throat and lung diseases attack even the natives. Back from the coast toward the north the land rises, the climate and surroundings are less unhealthful, and life is safer and more tolerable.

This narrow strip of coast was, a hundred years ago, variously indicated from Liberia to the mouth of the Niger River as Grain Coast, Ivory Coast, Gold Coast and Slave Coast, so named from the different commodities found by trading vessels which touched

at various points along the coast line. Our modern maps retain only the Gold Coast, or, as it is officially designated, Cape Coast. The latter lies a few degrees either side the meridian of Greenwich, with a population variously estimated at one hundred thousand and upward, of whom at least one-fourth are credited to Cape Coast Castle, the principal city. As may be supposed from the name, gold was once found here in considerable quantities. It is still found in various localities to a limited extent.

Africa has a coast line singularly lacking in good harbors, and along the entire Guinea coast the mouths of the rivers are blocked by sand-bars, making the shore difficult of access. Passengers and cargo are consequently discharged in boats through the heavy surf, making the unloading of a vessel dangerous, sometimes resulting in the loss of life and merchandise in the effort to effect a landing. The boats are built of heavy timber, twenty-eight feet long, six feet beam, and have long, over-lapping bow and stern, that they may surmount the breakers. These boats, which are maintained by trading firms, are English-built and will carry a weight of about two tons each. A boat's crew is made up of eleven men and a coxswain. The latter steers with an ordinary long-bladed, straight oar or sweep, while the crew sit on the gunwales of the boat and propel it with paddles, the blades of which are fashioned not unlike a trident. The crew are almost naked, a loin cloth being the only attempt at clothing.

The customs of the country, even where white people are located, are still exceedingly primitive. There are several reasons for this, one of which is found in the climate, which is destructive to everything which mold or rust can ruin, especially during the wet season. For instance, there are no cooking-stoves in the country. The native custom of cookery (and the foreign residents usually employ native servants) is to build three cones of mud as a support for each kettle, making the fire between them. These mud cones are built against a wall or in the center of the yard, as is most convenient. The cooking utensils are sometimes of iron or other metal, shipped from England, but more commonly of home construction, made of the native clay and burned, as is the custom with primitive peoples in all countries.

The markets are usually held twice a week in some locality con-

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venient of access to several neighboring villages along the thoroughfares, or in the large towns in an open place designated for the purpose. Almost everything obtainable in the country is offered for sale in these markets. Cloth hangs in the booths at one side, heaps of fruit or vegetables in woven tray-like baskets of native make; piles of peppers, malodorous heaps of fish and trays of palm nuts are displayed for sale. The market-place swarms with people in various attire. Colors light and dark, vividly striped or splotched in huge patches, enliven the scene; women with large wraps of cotton cloth covering the head and shoulders or arrayed in hats of all sizes and shapes, men attired in brilliant turbans and more or less voluminous loin-cloths, stand over their commodities or squat by them in the open sun or shelter themselves sometimes by an umbrella, while a jargon of voices as bewildering as the colors makes the market place a study for the foreigner.

The air seems to swarm with germs. Everything eatable spoils in a short time, adding its own distinctive odor to the already burdened atmosphere. Food even when cooked will last but a few hours. *Medical Missionary*, Dec., 1897.

REVIEWS.

A Commercial Geography of the British Empire. LIONEL W. LYDE. Methuen & Co., London. 1898. Pp. 156.

This is the second edition of one of the books in Methuen's "Commercial Series," which is, according to the advertisement, "intended to assist students and young men preparing for a commercial career by supplementing useful handbooks of a clear and practical character, dealing with those subjects which are absolutely essential is a business life "—a most laudable intention in these times, when the task of our large secondary day schools is how to educate the majority of its members who leave school at the age of fifteen or sixteen. To such "students" and "young men" we have little hesitation in strongly recommending Mr. Lyde's Commercial Geography, and we do so for this reason: It is not only a practical book, but one of causes and consequences, whys

and wherefores, and therefore of true educational value. In none of the numerous commercial geographies published now-a-days to catch the utilitarian eye do we find such insistence upon first principles in geography, Mill and Chisholm of course excepted.

The good teacher of commercial geography cannot advance a step without constant recourse to his physical geography. seem a curious method of argument, but what we especially like in Mr. Lyde's Commercial Geography is his Physical Geography. He breathes it on every page, and every page is in consequence instinct with lucidity. He is no lister of imports and exports, any more than he is of capes and bays, rivers and mountains. were especially struck with this trait in his Man and His Markets, another commercial book which should be in the hands of all commercial students. He succeeds just where many authors fail; he acts up to his preface. "This volume," he says, "consists of two parts-an Introduction on general principles and an Application thereof;" he is good throughout his introduction; he is best, we think, in his Canadian application. The "Director of Commercial Statistics at Guayaquil" (v. p. 37) might spend many an hour less profitably than in reading this little book.

Of the many excellent items we commend to the judicious teacher for development along the lines of Mr. Lyde's book, are such stock subjects as the connection between the commercial character of nations and physical geography (Holland, Egypt and Brazil, p. 11), and Settlement compared with Trade colonies (passim) and such comparative novelties as the defence of preferential railway rates for foreigners (p. 41) and the up-to-date advice to British agriculturists "grow grass and make milk" (p. 72).

Having said this much in praise of a book, the perusal of which is bound to instruct teachers as well as taught, we may be permitted a genial snarl by way of showing that we are impartial critics. There are some very doubtful statements in the sections dealing with climate; the index is admittedly meagre—a point of importance to the teacher, for a geography without a good index deprives him of an opportunity of treating old subjects in new ways. We do not like the antiquated look of such spellings as Elbrooz and Sophia, nor the excessively modern appearance of Staffhausen. We think that the note on Klondike gold might

have found a more suitable place of insertion than as an addendum to the fur trade of Canada. Our grammatical nerves are jarred to find thirteen "ands" on one page, and to read "Fort York is nearer to Liverpool than Montreal is." This may be hypercritcal, but surely in a book dated 1898 Mr. Lyde or his publishers might have arranged that Burma should be treated in conjunction with India, and not reserved to a small half-page section by itself with Ceylon thrown in between as if to point the separation. Such an arrangement is as injudicious, to say the least of it, as that which, at the close of the book, devotes another special section to the defunct *Crown Colony* of Bechuanaland, without a word as to its now three-year-old incorporation with Cape Colony.

E. R. W.

The Story of the Atmosphere. By DOUGLAS ARCHIBALD. The Library of Useful Stories. New York, D. Appleton & Co. 1898. 18mo. Pp. 190. Charts and figures, 43. Price, 40 cents.

Mr. Archibald has given us an attractive story in this little book, which we doubt not will find and please many readers. The modern aspects of meteorology have received due attention, considering the size of the volume, and anyone who reads this book carefully will gain a fair appreciation of much of recent investigation and writing. The Story of the Atmosphere is not fitted to serve as a school text-book; it is rather a book to be recommended to the general reader who wishes to gain some knowledge of meteorology quickly and to have the information presented in an interesting manner.

Mr. Archibald has drawn very extensively upon Davis's Elementary Meteorology, but many of the figures in The Story of the Atmosphere, copied from the former work, have been reproduced in a very crude manner. Aconcagua we have not been accustomed to seeing written Aconcaqua (p. 155). And to speak of Ferrel as "the late Mr. Ferrel, of the American Weather Department" (p. 48), seems almost ludicrous to Americans.

We note a chapter on "Flight in the Atmosphere" (Chap. XIII.), an innovation, decidedly, in a book on general meteorology, but a very sensible and, we may say, a very necessary innova-

tion, for kite and balloon meteorology are playing a considerable share in the present development of this science.

R. DE C. W.

CURRENT LITERATURE.

Annales de Géographie, Paris.

July. Lederlin and Gallois, The Culture of Cotton in the World; Zürcher, The Relief of the Middle Part of the Lower Alps; Pasquet, The Growth of London; Raveneau, The Works of the Russians in Northern Asia; Gautier, Hypsometry of the Northern Part of Madagascar.

September. Bibliography of Geography for 1897.

- Deutsche Geographische Blätter, Bremen. Braess, The Suabians in Banat (Hungary); Grothe, The Tripolitans and the Sudan Caravan Trade; Greffrath, The New Hebrides.
- Geographical Journal, London. September. Carles, The Yangtse Chiang; Weathersley, Circumnavigation of Lake Bangweole; Wellby, Through Tibet to China; Barrett-Hamilton and Jones, A Visit to Karaginski Island; Heawood, African Books of 1897–98; Kropotkin, The Old Beds of the Amu-Daria.
- Geographische Zeitschrift, Leipzig. September. Jung, The Economic Relations of the Australian Colonies.
- National Geographic Magazine, Washington. September. McGee, The Growth of the United States; Goode, Bitter Root Forest Reserve; Jefferson, Atlantic Estuarine Tides; Gannett, The Forest Conditions of the State of Washington.
- Scottish Geographic Magazine, Edinburgh. September. Sutherland, South Tenasserim and the Mergin Archipelago; Recent Hydrographic Research in the North and Baltic Seas.
- Société de Géographie Commerciale, Havre. Marche, Notes on a Voyage to the Mariana Islands; Lièvre, Travels in Japan and Korea; Dafert, Actual State of Coffee Culture in Brazil.

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THE TEMPERATURE OF THE BRITISH ISLES.*

The sun is the predominating influence which determines the annual distribution of the temperature over the British Islands. The annual isotherms run approximately east and west, with one or two important modifications. That of 52° F. in southwest Cornwall, at 50° N., that of 46° F. through the Shetland Islands 60° N. From Southampton north through the central districts of England the distances between each successive isothermal do not differ greatly from each other, but there is a greater distance in Scotland between the isothermal of 48° and 47°. The greatest differences of distance between the isothermals are where they are cut by the line of longitude 4° W. These distances reckoned from Dorsetshire northward to Cromarty, are 92, 155, 56, 58, and 184 miles. This is the degree of longitude which passes through those districts which offer the strongest contrasts in the distribution of land and water. The disturbances here referred to, as shown by the isothermals, point to another influence, viz., that of the ocean, which, next to that of the sun, most powerfully effects the British Islands.

Monach, in the Western Hebrides, and Scilly, in the British Islands, have strictly insular climates comparable with each other.

* From the Journal of the Scottish Meteorological Society, Third Series, Nos. 13 and 14, 1897, which contains 13 maps of temperature.

The mean annual temperature, at sea-level, of Monach is 47°.5, and of Scilly 52°.6. The difference is thus 5°.1; and since the difference in latitude is 7° 37′, the rate at which the temperature falls from Scilly northward is one degree Fahrenheit for ninety geographical miles. Lairg, in the center of Sutherlandshire, and Salisbury, Wilts, may be taken as representing the most northern and southern land stations. The mean temperatures at sea-level are respectively 46°.4 and 50°.0, the difference being 3°.6; and since the difference in latitude of the two places is 6° 57′, the rate at which the mean temperature rises from Lairg southward is one degree Fahrenheit for 116 geographical miles.

Since the prevailing winds of the British Islands are west-south-westerly, it follows that the influence of the ocean on the temperature of the air is much greater in the west than in the east. The mean temperature is everywhere greater on the west than on the east coasts; and, while on the west the temperature of the sea is about 3°.0 higher than that of the air, on the east it is 1°.0. Further, the prevailing winds over St. George's Channel and the Irish Sea assume a more southerly direction than elsewhere, resulting in the remarkable curving northwards of the isothermals over the coasts and islands of these seas.

But it is in the winter months that the beneficial influence of the ocean is most strikingly apparent in maintaining a temperature very greatly in excess of what is due to mere latitude and season; and this influence is the more decided just in proportion as the locality is surrounded or enveloped by the warm waters of the At. lantic. This point is well shown in Batchelder's map of Isabnormals of Temperature for January, by which it is seen that in this month the mean temperature is higher than what is due to mere latitude and season to the extent of 24° in London, 30° in Edinburgh, and 36° in Shetland. In other words, but for the ameliorating influence of the Atlantic, spread over these islands by the prevailing west-southwesterly winds, the mean temperature of London in the middle of winter would be 15°, of Edinburgh 8°, and of Shetland 4°. Hence, but for the warmth derived from the Atlantic, the winter of London would resemble that now experienced in the northwest of Iceland, and the winter of Edin burgh would rival in severity that of the south of Greenland.

The mildest winter climates are found on the southwest of England and Ireland, where the mean temperature in January is 6°.0 higher than that of London. Since, however, these regions are characterized by a comparatively large rainfall, and its concomitant, a moist climate, it is evident that, considered as a curative and preventive agent, their climate is best suited for those complaints which require for their successful treatment a mild, moist atmosphere.

Where, however, a drier atmosphere is required, having at the same time a temperature decidedly milder than is to be found in inland and eastern situations, it must be sought for along the shores of the Channel, farther to eastward than Dorsetshire. From Dover to Portland the rainfall varies from 28 to 30 inches annually, the amounts differing within these narrow limits according to the flatness or boldness of the coast or vicinity. To the west of Portland the rainfall rises considerably to Prawle Point, and more rapidly to the westward till it reaches 44 inches at Penzance. On striking inland, and ascending the slopes of the Downs, the rainfall rises to 34 and 36 inches.

The whole of the eastern coast of Great Britain varies little in temperature in January, the increase from Lairg to Greenwich being only from 37°.0 to 38°.5, the temperature of the coast being only a little higher than that of strictly inland situations. But on arriving at Dungeness we meet a January mean temperature of 40°.2; and from Dungeness westward there is a continuous increase, at first slow, and then more rapid on nearing Weymouth, the mean of which is 41°.6. Upon proceeding from any point of this coast upon the Downs, temperature falls much more rapidly than what is due from height alone, since the winds gradually acquire a lower temperature from the cooled surface of the land; and this diminution of temperature continues northward to London, which is 3°.1 colder than Weymouth. To the west of Weymouth the increase of the temperature becomes more rapid, the means being 42°.6 at Torquay, 44°.5 at Falmouth, 46°.0 in the Scilly Isles, the last temperature being as high as the temperature of London in the beginning of April.

It follows that where winter climate is sought, offering, in the highest degree anywhere afforded by the British Islands, the combined qualities of mildness and dryness, such a climate is to be found on the shores of the Channel, from about Dover to Portland. To the west of Portland, and round the coast to Clifton, a higher temperature may be had, but the rainfall is greater, the climate damper, and raw weather of more frequent occurrence. On the other hand in the eastern counties north of the Thames the climate is as dry, or rather dryer, but it is accompanied by a temperature from 2°.0 to 3°.0 colder.

The south coast has another climatic advantage, which may be noted. The prevailing west-southwesterly winds having crossed the Isle of Wight, pass on in the direction of London. Now observations show that in passing from the Isle of Wight to London, the mean temperature being caused by the more rapid rate by which, as compared with the sea, the land is cooled by terrestrial radiation in winter. From this lowering of the temperature on proceeding inland, it follows that haze and cloud are formed with greater frequency and of greater denseness as the winds successively advance on the colder districts. Hence the skies of the south coast may be expected to be clearer and brighter than in the valley of the Thames, a statement observation amply confirms.

Various other districts in Wales, the northwest of England and the west of Scotland, might be named which offer no inconsiderable inducements as winter refuges, from their higher and more equable temperature at this season. All sanitaria on the south and west coasts have, as compared with inland places, this additional strong recommendation: In such severe winters as those of 1814, 1820, 1838, 1855, 1860, 1867, 1870, 1874, 1878, 1881 and 1895, while the mean temperature has fallen at many places to from 9°.0 to 13°.0 below the average of the months, it has been observed that over extensive districts on the coast the temperature fell below the average only a third of these amounts. This great advantage of seacoast localities will be better appreciated if there be kept in mind the great, and in many cases alarming, increase in the mortality from throat diseases which accompanies severe cold in winter; and it is to be noted that this advantage is enjoyed in a greater degree on the west coast in localities which are well open to the Atlantic, than on the south coast, which the comparatively narrow waters of the Channel less effectually protect.

Since the averages of temperature given with this paper are all calculated for the same forty years, this essential element of climate is therefore strictly comparable throughout. One important result is that all strong statements, such as are not unfrequently made in favor of local climatologies, as regards their temperature, entirely disappear. It would be easy to find considerable difference of temperature among places, so that one place may seem to have a fine winter climate, quite its own, by selecting different years for the different places in striking the averages; but all such comparisons of local climates are worthless.

The influence of the land in lowering the temperature in winter is most strikingly seen in the case of Ireland, which is more completely bathed in the warm waters of the Atlantic than Great Britain. In Ireland the lowest temperature is in the interior towards the northeast, or lee side, so to speak of the island, and from this central space the mean of which in January does not exceed 40°.0, temperature rises all around, but especially towards the southwest, on advancing in which direction it rises successively to nearly 45°.0. On account of the lower temperature of the North Sea in winter as compared with the Atlantic, and the prevailing winds, the isothermals there do not present this feature in so striking a form. There are, however, large irregular patches, extending from Essex through the eastern central districts to near the Pentland Firth, over which the winter temperature is a little lower than it is all round.

The temperature of the sea falls to its annual minimum in March. But in inland situations the temperature of the air in the same month has already risen several degrees above the annual minimum. At Greenwich, for example, the temperature of March is 4°.7 higher than that of January. In situations open to the ocean, the temperature of the air in March is but little in advance of that of January. Thus in Scilly it is only 0°.5 higher, and at Holyhead 1°.2, whilst at Dunrossness, North Unst and Monach, it is 0°.8 lower. In connection with these different relations of land and ocean to the temperature at this season, the changes in the positions of the isothermals from January to February, and then to March, are extremely interesting.

It is in April that the isothermals make the nearest approach

to straight lines not deviating greatly from an east-and-west direction. But even in this month there is seen the depressing influence of the Irish and North Seas, on the one hand, and the elevating influence of the land, on the other, on the temperature of the warmer months. These influences culminate in July, and from the trustworthy means now available from so large a number of places, we are able to draw the summer isothermals of the British Islands with a correctness greater than was previously possible.

It now appears that in the summer months the warmest portion of Ireland is the southeast, and that the isothermals there follow a course more nearly north-and-south than east-and-west; and a similar course is followed on the west of Great Britain, particularly to the north of the Solway. It has been shown * that in the summer months northwest, north and northeast winds prevail six days, and southeast, south and southwest winds seven days fewer than in the winter, and that this shifting of the wind more to northward in summer in Scotland is only part of a great seasonal change of wind common to the whole of northwestern Europe. This northing of the summer winds doubtless plays an important part in the peculiar distribution of temperature, as shown by the disposition of the isothermals over the west of Ireland and of Scotland.

The depressing influence of the ocean in summer, in lowering the temperature in the west, is also seen in the case of the Irish and North Seas. The isothermals of 58°, 59° and 60° show in a most striking manner the depressing influence of these seas and the Atlantic. The dip southward of the line along the east coast, particularly along from Buchanness to Colchester, may be specially referred to as pointing to temperature conditions of the North Sea which ought to be made the subject of careful and continuously conducted observations.† The inquiry is not merely of great interest, as tending to fill up a blank in the physical geography of the British Islands, but of public utility from its direct bearing on the important fisheries of the North Sea.

The influence of the land in raising the temperature is now seen in a very pronounced manner. Some of the details are of interest;

^{*}Scattish Meteorological Journal, New Series, Vol. III., p. 298.

[†] Scottish Meteorological Journal, Vol. I., pp. 333-335.

such as the close relations between the forms of the isothermal curves, and the breadth of the land from west to east, and the peculiar form impressed on the isothermals of 59° and 60° for July and August, as these pass North Wales, this peculiar form being due to the contour of the coast in this part of the course of the isothermal, together with the prevailing winds. The general result is, that the lower temperature which is to be traced to the influence of the ocean and the seas which envelop the British Islands, extends farther inland than was for long supposed, and that the temperature of the more strictly midland districts is higher.

The highest summer temperature occurs in the valley of the Thames, around London, in the district enclosed within the isothermal of 63° or 64°. The highest mean temperatures in July, after allowing for height, are Camden Town 64°.4, and Greenwich 64°.3, and a large number of places in the vicinity of London have a July temperature of about 64°. This, then, is the part of the British Islands where the summer heat is greatest, and it is here where many fruits and flowers can be brought to greatest perfection.

As regards the south coast, the difference of mean temperature is slight, but such differences as do appear indicate a diminution of temperature from east to west. The following indicate the amounts the July temperature is lower than that of London: Margate, 1°.8; Brighton, 1°.4; Ventnor, 2°.0: Weymouth, 2°.2; Prawle Point, 3°.1; Falmouth, 2°.6; Scilly, 2°.8; and Weston-Super-Mare, 1°.1.

From its complete insular position, the Isle of Man offers great advantages for the coolness of its summer climate and for its mild winters, advantages all the more marked because nowhere in the island is the rainfall excessive. Rothesay, and other watering-places on the Firth of Clyde, also have desirable climates, characterized by cool summers and mild winters; but the rainfall there is heavier than on the south coast and in the Isle of Man.

A third important element in determining the temperature is height above the sea, the effect of which, as regards the British Islands, is a lowering of the mean temperature at the rate of about one degree for every 270 feet of elevation. The great attraction

of the summer climate of the Scottish Highlands is its comparative coolness, which becomes all the greater the higher we ascend. compared with London, the temperature of Braemar is about 9°.0 lower during the summer months from June to September, and 7°.5 in October, with evenings and nights proportionally colder The rainfall of these upland districts of the east than the days. of Scotland is also comparatively small. The admirably bracing and other hygienic qualities of the air of those regions which have relatively dry climates, and are 700 feet and upwards above the sea, are everywhere recognized; and it is these qualities which give the upper districts of Deeside, Donside and Speyside the finest summer climates anywhere to be found in the British Islands, particularly for those whose systems require bracing up for the work of the coming winter, these being the climates best suited for active exercise on the hills and moors. No other district, at these heights and with these temperatures, can be named, having the accommodation visitors require, but has a summer climate essentially wet. The climates of places 700 feet high and upwards in Wales, the Lake Districts, the South and West Highlands of Scotland, can only be described as wet, compared with those of the upper districts of the Dee, Don and Spey.

Many excellent summer climates, better adapted to those who contemplate less active exercise in the open air, are to be found at lower levels. Among the best of these, omitting seaside climates, are Lairg, Banchory, Blair-Atholl, Pitlochry, Dunkeld, Crieff, Innerleithen, many of the eastern upland districts in the north of England, and on the Downs. In all these localities the rainfall is at least moderate in amount, and their climates may be characterized as dry.

The isothermals of September closely resemble those of April in approaching to straight lines running, roughly speaking, east and west, the chief difference being that whereas in April the lines slant from west-northwest to east-southeast, in September the slant is rather from west-southwest to east-northeast. The isothermals of October may be regarded as transitional from summer to winter. The more rapid cooling of the land is strongly expressed in the curving southwards of the isothermals where they cross the land. The effect of the higher temperature of the sea is also seen in

keeping up the temperature at all places within its influence—the isothermals, for example, curving a long way to northwards as they cross the Irish Sea, and also in some degree in the east coasts of England. In November the isothermals exhibit a still closer approach to these of the winter months. Indeed, in this month, the temperatures of inland districts from Yorkshire northwards show greater differences, when compared with those of the seas adjoining, than in any other month; and the curving northwards of the isothermals on the coast from the Thames to the Forth is very striking. And this feature in the maintenance of a higher temperature to the north of the Moray Firth in November and December, and the influence of the Atlantic is most pronounced in these two months.

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OUR KNOWLEDGE OF THE ANTARCTIC.

Geographical Summary.—The comparatively few vessels which have explored the Antarctic regions have only very partially lifted the veil that hangs over them. Whether there exists an extensive continent beneath the enormous ice-cap, or only a collection of islands, cannot yet be affirmed from actual observation, but the shallowing of the ocean towards the Pole indicates the existence of a plateau on which considerable masses of land are no doubt based. South of America the Antarctic land consists of a series of archipelagos and islands, in which volcanic energy has displayed great activity in the past, and even now has not entirely passed away. Connected by the Burdwood bank, on an average only 110 fathoms below the surface of the sea, with Cape Horn, they seem to form a prolongation of the American cordillera, and are perhaps fragments of a great continent that once connected America with In South Georgia, a long island surrounded by a Australasia. number of small islets and rocks, and running from west-northwest to east-southeast, the geological structure seems, as far as it has been investigated, to point to such a connection. The area of the group may be estimated at 1,600 or 1,700 square miles, and it

rises in the Wetterwand, the highest point seen, to some 7,200 feet.

Southeast of South Georgia the South Sandwich group of sixteen islands runs from north to south in a curve concave to the west, beginning with the Savadovski Island, which, at the time of Bellingshausen's visit, was an active volcano rising 1,100 feet above the sea and ending with Southern Thule.

The South Orkneys extend nearly east and west and consist of Laurie Island, 250 or 300 square miles in area; Coronation Island, nearly twice as large, and a number of smaller islands and rocks. They are almost entirely covered with glaciers, and of considerable elevation, a mountain on the northeast coast of Coronation Island having been estimated at over 5,000 feet.

The South Shetlands stretch southwestwards between lat. 53° and 63°, and long. 61° and 63° 30' W. At the eastern extremity the principal are Clarence and Elephant Islands, small in area, but rising to heights of 3,500 and 4,500 feet, with several islets. Then comes the central group, of which King George and Livingston are the largest, and Deception Island the most singular, stretching for a distance of 150 miles. King George, the largest Deception Island, disof all, is about 55 miles long by 16 broad. covered in 1829 by Captain Foster of the Chanticleer, is a crater into which the sea has found its way, as at St. Paul. It contains hot-springs and fumaroles, which also occur on Bridgman Island, an extinct volcano far to the east of the group. Smith Island, which with Low Island, forms the western part of the South Shetlands, separated from the middle group by Boyd Strait, 30 miles broad, is the loftiest of all, culminating in Mount Foster, fully 6,200 feet high. The whole group is high and sinks in most parts steeply to the sea, and its southern shore at least is of volcanic origin. Snow and glaciers cover the greater part of the surface.

The broad Bransfield Strait separates the South Shetlands from the islands known as the Dirk Gerritsz Archipelago, consisting of Joinville and Dundee Islands, Louis Philippe Land, Trinity Land, Palmer Land, and numerous smaller islands. Joinville Island has a length of about 50 miles, and it extends fully 20 miles from north to south. Dundee Island, separated from it by Active Sound, 30 miles long, 2 to 3 broad, and of considerable depth, is

about 29 miles long, with an average breadth of over 4 miles. The western part of Joinville Island is comparatively low and even, while the eastern is occupied by Mount Percy, 3,600 feet high, from which some of Ross's officers thought they saw smoke The snow and ice which covers all the other parts of this island, as well as Dundee, forms along the sound a wall twenty-five to sixty feet high. Dr. Donald found a schistose rock on Joinville Island in situ; on the north shore of Dundee Island debris of granite, sandstone, conglomerate and eruptive rocks, which, if they were not derived from the Island, showed that such rocks cannot be far distant. A large portion of the west coast of Louis Philippe Land towards Orleans Channel is entirely unknown. In the north it rises in Mount D'Urville to 3,000 feet, while Mount Haddington in the south, the highest elevation on this side of the Antarctic, is 7,000 feet. The eastern coast is indented by two large bays, the Erebus and Terror Gulf, and the Sidney Herbert Bay; Seymour Island is interesting as the only place in the Antarctic where fossils have been found, while Cockburn Island, in Admiralty, is the most southerly point where vegetation has been observed, except the lichen found by Mr. Borchgrevink.

South of Louis Philippe Land is situated the northern point of Graham Land, or Oskar II. Land, with numerous islands discovered by Captain Larsen lying off the coast, two of which are active volcanoes—Christensen Island and Lindenberg's Zuckerpot. Oskar II. Land is comparatively low in the north, but rises to a considerable height in the Jason Berg. Further south are four ranges named by their discoverer Foyn Land. The coast runs southsouthwest as far as Foyn Land, then advances eastward to 60° 40′ in lat. 67° S., whence it continues south or south-southeast into the unknown.

Of Trinity Land and Palmer Land, between Orleans Channel and Bismarck Strait, and separated from one another by Hughes Gulf, very little is known. They are hilly and covered with ice and snow, and the gulf and strait are beset with numerous islands. That Hughes Gulf converges with Bismarck into an open sea between these islands and Louis Philippe Land and Oskar Land, is a conclusion drawn solely from Captain Larsen's observation on Christensen Island.

Still less is known of Graham's Land. It seems, from the reports of Biscoe, Evensen, and others, to be a hilly, ice-covered land apparently continuous. Here, too, numerous islands line the coast, the Kaiser Wilhelm Islands in Bismarck Strait, the Biscoe Islands farther south and out to sea, and finally Adelaide Island, a rocky ridge some 5 miles long. More than a degree farther south is Bellingshausen's Alexander I. Land, and a few miles off Peter I. Island, about 11 miles long by 5 broad, and rising to a height of over 4,000 feet. Beyond this point no land has been sighted until Ross's Victoria Land is reached, unless Cook's Ne Plus Ultra in lat. 71° 10′ S. and long. 106° 54′ W. is land, which seems not unlikely, though the explorer did not claim the discovery.

More than fifty-four degrees of longitude separate Cook's Ne Plus Ultra from the point where Ross sighted the last appearance of land in 71° 10' S. and 161° 27' W., and 300 miles of ice-barrier extend thence to the southern point of Victoria Land. in extent and in elevation this land is the largest mass yet discov-From Cape Adare, in lat. 71° 18' S., the ered in the Antarctic. coast, indented with numerous fiords, runs northwestward for 120 miles to Cape North, and then apparently turns southwestwards, begirt by a lofty ice-barrier. In this direction Ross saw several elevations which he thought were probably mountains. On the other side the coast runs southward from Cape Adare as far as Cape Cotter, indented here also by the deep bays, and then inclines to the southwest, the bays becoming broader and shallower, and from Cape Washington it sweeps in a long curve round to M'Murdo Bay on the western side of Cape Bird and Mount Erebus, beyond which it merges near Cape Crozier into the barrier, 450 miles or more from Cape Adare. Over the whole length the background is occupied by mountains of great height, from Mount Eliot, behind Yule Bay, in the north, to the Erebus and Terror in the south. They attain heights of 12,000 feet and over, Mount Erebus measuring 12,400, while Mount Melbourne is probably still higher, though Ross could not approach it sufficiently near to estimate its height. The valleys between these giants are filled with snow drifted down from their summits, which are almost all, except the active volcanoes, shrouded in snow. Only the steep basaltic cliffs of Mt. Adare are exposed. Even Mount Erebus, the

loftiest volcano of the world, is covered with snow up to a few hundred feet from the crater, which occupies the summit. Mount Terror, however, is much freer from snow. The ice-barrier, 100 to 150 feet above the sea, is level on its upper surface, and probably its outer edge floats on the sea, for Ross sounded 410 fathoms east of Cape Crozier, whereas he found much shallower water between Franklin Island and M'Murdo Bay, as also further north.

Nearly 300 miles north of Ross's most westerly point lie the Ballemy Islands, a group of volcanic origin, probably on the same line of weakness as the Possession and other islands. They consist of three large and four small islands, and their highest peak, Mount Freeman, is, as stated above, estimated at about 12,000 feet in height.

It seems by no means improbable that Victoria Land may join Wilkes' Land on the west, forming a continent, if the latter is really a continuous mass. The most easterly point actually ascertained to be land is situated in about 67° S. lat. and 158° E. long., where Ringgold's Knoll and another conical peak were seen; while the westernmost point, Knox Land (Termination Land having probably no existence), is some 1,700 miles to the west. In long. 154° 30' a deep bay was entered by the Vincennes, where a sounding of 500 fathoms was taken by the Peacock. Next succeeds the Adélie Land of D'Urville; it has a fairly uniform elevation of not less than 3,000 feet, and its coast has been seen for a distance of 120 or 130 miles. Apparently, from Wilkes' observations, it joins the Clarie coast. Then comes North's High Land, separated only by Porpoise Bay, followed by Sabrina Land. Budd's High Land, a lofty range, and Knox's High Land succeed one another at greater intervals. The land has throughout an elevation of 3,000 feet or more, and is begirt by an ice-barrier about 100 feet high, and therefore much lower than the huge wall east of Victoria Land.

Westwards there is again a long interval of nearly forty-five degrees of longitude, where the presence of land at no great distance beyond the sixty-eighth parallel can only be inferred from the dredgings of the *Challenger*. In lat. 66° 25' and long. 59° E. lies Kemp Land, a coast some 35 miles in length, of which nothing further is known. Enderby Land was first sighted in long. 47°

20' E. and lat. 65° 57' S., and a conspicuous promontory on long. 49° was named Cape Ann; its exact length is uncertain. From Enderby Land the coast must turn southerly, or Moore would have sighted it, and must run at a high latitude towards Graham Land, seeing that Weddell saw neither land nor ice at 74° 15' S. This is all that can be stated about the Antarctic between the longitudes of 40° E. and 50° W. A glance at the map will show how small a fraction of Antarctica, whether it be ice, continent, or islands, which has been estimated to occupy an area of 400,000 square miles, has been seen by man.

Geology.—Scientific observations in this and other sciences have been very few. Recent volcanic rocks are nearly everywhere predominant; and volcanoes actually active or not long extinct are present in nearly all parts. They have not yet been observed in South Georgia, and the western part of Wilkes' Land and Enderby Land do not present the well-known conical forms. South Georgia alone has been subjected to a somewhat closer examination by Dr. Will of the German polar station. In the neighborhood of Royal Bay phyllite lies along the coast in layers, alternating with phyllite-gneiss; then follow southwards clay-slates alternating with quartzite, and near the Weddell glacier half-crystallized clay-slates, enclosing thick layers of schalstein as well as true sandstones. These rocks slope southwestwards or towards the longer axis of the island, and more steeply in the interior than on the coast and have probably assumed a metamorphic character under pressure. sils have not been found, but the presence in the rocks of carbon in microscopic particles indicates that fossils were formerly inclosed in them. Weddell's Land, in the South Orkneys, has also a somewhat similar structure, as far as D'Urville's rapid examination shows, and Smith speaks of a bluish-gray schist in the South Shetlands.

Recently several sealing vessels have brought home from the islets of Graham Land, to the south of the South Shetlands, pieces of different varieties of granite, together with some volcanic rocks and fossiliferous limestones. So far as these rocks have been studied, they do not appear to differ from similar rocks all over the globe. The granites have been found by Mr. Teall to be just such masses as might have come from any old mountain-group in Europe or America.

Among the specimens brought from Joinville and Dundee Islands, which form the northeastern termination of Graham Land, there was one piece of reddish jasper which at once attracted my attention from its resemblance to the "radiolarian cherts" now found to be so widely distributed among the older Palæozoic rocks, both in the Old World and in the New. On closer examination, this first impression was confirmed; and a subsequent microscopic study of thin slices of the stone proved the undoubted presence of abundant radiolaria. The specimen was a loose pebble picked up on the beach of Joinville Island. We have no means of telling where it came from or what is its geological age. But its close resemblance to the radiolarian cherts, so persistent in the Lower Silurian formations of the United Kingdom, raises the question whether there are not present in the Antarctic regions rocks of the older Palæozoic age.

Among the specimens brought home from Seymour Island in the same district are a few containing some half dozen species of fossil shells, which have been named and described by Messrs. Sharman and Newton, who suggest that they point to the existence of Lower Tertiary rocks, one of the organisms resembling a form found in the older Tertiary formations of Patagonia. Large, well-developed shells of *Cucullæa* and *Cytherea* undoubtedly indicate the former existence of a far milder climate in these Antarctic seas than now prevails.

Non-volcanic rocks have also been found on the other side of the Pole. Off Victoria Land the sounding-lead of the Erebus brought up a fragment of granite. On small islands off the Adélie coast D'Urville found a crystalline rock—gneiss or amphibolite. The Challenger made three soundings in high latitudes, near the parallel of 65° in depths of 1,675, 1,800 and 1,300 fathoms, and brought up blue mud and fragments of rock bearing marks of glacial action. These consisted of granite, quartz diorite, diorite schist, amphibolite, mica-schist, sandstone, compact limestone, and clay-slate—all continental rocks. Eruptive rocks of recent origin were nowhere found in high latitudes on this side of the Pole.

Meteorology.—As the midsummer of the southern hemisphere occurs near the time of perihelion, when the velocity of the earth is at its greatest, the summer of the south is shorter than on this side

of the equator, the sun being 179 days south of the equator, and 186 on the northern side. Consequently it may be inferred, à priori, that the climate of the Antarctic is colder than that of the northern Polar regions. Another very important difference between the circumpolar regions is that, whereas the Arctic ocean is closely shut in by land, the ice-covered Antarctic continent lies in the midst of a great ocean, the nearest land being the narrow extremity of South America. It should, therefore, possess an oceanic climate, one, that is, in which the extremes of temperature are modified and the range is small, with a large precipitation. No observations have been made in winter within or very near the Antarctic circle, but such as have been recorded in the surrounding ocean, or in high latitudes in summer, are in accordance with the above conditions. Ross was in the Antarctic regions between the parallels of 62° and 78° in February in 1841-43, and only on eighteen days did the thermometer rise above freezing-point. the Sixth International Geographical Congress, Dr. G. Neumayer showed by comparing the records of vessels in corresponding latitudes that the temperature both of air and water in the higher latitudes is 14½° to 18° lower in the Antarctic Ocean. ness of the temperature is also evidenced by the observations of the German polar station in South Georgia, where the mean for the year was 34°.5, for the warmest month, February, 41°.5, and for the coldest, June, 26°.8; and this in a latitude as low as 54°. The vast expanse of ice which reduces the temperature of the surrounding waters by means of winds and currents and the frequent fogs obscuring the sun in high latitudes, are no doubt contributary factors.

The oceanic character of the climate is indicated by the closer parallelism of both the isobars and isotherms, as compared with those of the northern hemisphere and the narrowness of the belt through which each moves in the course of the year. The higher isotherms, indeed, which can be drawn for all seasons, for data are wanting from high latitudes for the summer months, further confirm this oceanic character by the irregularities they exhibit in the neighborhood of large masses of land, especially Australia, which, extending over many degrees of longitude and being comparatively low, forms a reservoir of heat.

Nothing is known of the quantity of precipitation. In summer on the sea and along the coasts it must be considerable. Ross noted south of 70° showers on 31 per cent. of the days, and Wilkes and D'Urville speak of heavy rain in lower latitudes. Snow, however, is, owing to the coldness of the climate, the more common form, and Ross records snow on a large proportion of the days he spent in high latitudes. Towards the interior and in winter the precipitation must be very small. From such a vast expanse of ice, however, there must be considerable evaporation, rendering the relative humidity of air, as in the Arctic regions, very high, and it is not impossible that the upper currents of air flowing to the anti-cyclonic area of the Pole may bring moisture with them which will fall in the form of ice-needles.

Dr. Buchan has pointed out how, south of latitude 55° S., southerly to southeasterly winds begin to increase in frequency, until from 60° lat. S. into higher latitudes, they become the prevailing winds. This is abundantly shown from the winds charted on the maps of the *Challenger* Report, as well as from the unanimous experience of all that have navigated this region from Ross to the present time. Thus the poleward blowing winds from westnorthwest in these summer months stop short, distant at least 30° of latitude from the South Pole.

These prevailing southeasterly winds necessarily imply in the analogous case of the North Pole, the existence of a more or less pronounced anticyclone overspreading Antarctica; which in its turn necessarily implies the existence of upper currents from the northward, blowing towards and in upon the polar region to make good the drain caused by the surface out-blowing southeasterly winds. It may, therefore, be concluded that both the surface winds and the upper aerial currents are diametrically opposed to the requirements of this theory.

Magnetism.—About 1838, Professor G. Gauss set forth his theory of earth magnetism and thereby gave an impetus to magnetic observation which resulted in the expeditions of Ross and Moore. The position of the south magnetic pole, as calculated by Professor Gauss, was 72° 35′ S. lat. and 152° 30′ E. long., but the dip at Hobart Town being higher than calculated, it was anticipated that its actual position would be found in about lat. 66°

S., and long. 146° E. Ross's observations, however, placed it in 75° 5′ S. and long. 154° 8′ E., or about 2½° south of the computed position. The observations of Ross, Moore, D'Urville and Wilkes enabled physicists to draw the curves of the magnetic elements in the Antarctic region with much greater accuracy than before, and the subsequent observations of the Challenger and the German station in South Georgia have added to the necessary data, but Ross was not within some hundreds of miles of the magnetic pole, which, moreover, is constantly changing its position, and the science of earth magnetism has made considerable progress in the interval so that its demands for accurate and numerous records are more pressing, so that a new calculation of the elements from the latest data has not been found satisfactory.

It is an interesting fact that Vespucci is the first to mention the Aurora Australis, and this lends some color to his statement that he reached 52° S. On this side, however, it is a somewhat rare phenomenon, no display having been seen in the year 1882–83 at the polar station in South Georgia, or at the French station near Cape Horn. On the other side of the pole it is more frequent owing to the proximity of the magnetic pole, and was witnessed by Cook and most other navigators.

Fauna and Flora.—Land vegetation, with the exception of the lichen found by Mr. Borchgrevink at Cape Adare, does not exist in the Antarctic regions, as far as it is yet known, at a higher latitude than Cockburn Island, the continent being almost entirely covered with ice and snow. Sir Joseph Hooker examined the flora of Cockburn Island and found it to contain twenty-nine species of mosses, algae, and lichens. On the more northern islands higher forms appear. A grass, perhaps Poa flabellata, has been reported from the South Shetlands by sealers, and in South Georgia the vegetation is somewhat more varied. Besides Poa flabellata, or Tussock grass, there is another grass, Aira antarctica, reindeer moss and other lichens, and several kinds of seaweed. The only plant with bright-colored blossom is the Ranunculus biternatus. The total number of phanerogams is thirteen. Corallines were found by Ross off Victoria Land; the other vegetation of higher latitudes consists of diatoms and others.

The animal kingdom is represented solely by birds and marine

animals, chief among which are the whales and seals, constituting with, perhaps, guano, the only commercially valuable products. The Greenland whale, *Balæna mysticetus*, though eagerly sought for of late, has not been found, and the fur seal, once abundant in the South Shetlands, has been exterminated. The marine fauna is abundant and affords a plentiful supply of food for whales and seals. *Flustræ*, shell-fish, and other small invertebrates were dredged up by Ross south of Coulman Island.

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A SUGGESTIVE COURSE IN GEOGRAPHY.

(Continued from page 328.)

SIXTH GRADE.

Review.—Review North America in connection with the boundary lines of the Governments—teach considerable history of the governments.

Continent Study.—

- 1. British Isles. Study as the continents were studied in last grade, making a contour map as before. Use England and Scotland as a standard of study. The cities, commerce, government and history are the principal topics.
- 2. Europe. (a) Draw according to scale. (b) Indicate relief by contour lines, or any other method, and locate plant zones by isotherms. (c) Locate plants in plant zones. (d) Locate railroads and steamship lines. (e) Locate cities in plant zones and study history of cities. (f) Locate boundary lines and history of governments. (g) Relation between relief and history.
- 3. Asia.—Study Asia in same way as other continents, but make the study less elaborate. The outlying continental islands should be studied in this connection.
- 4. Africa and Australia in same way. Commerce and methods of transportation should be a part of study of each.

Oceans.—In connection with continent study a series of ten or more lessons should be given on oceans. 1. Form and contact with land on all sides. 2. Configuration of bottom. 3. Currents.

Atmosphere.—The study of atmosphere may be continued in a series of lessons on local storms. 1. Thunder storms and showers. 2. Tornadoes. 3. Hurricanes.

Books of Travel and pictures.

In this grade much of the work done by pupils should be of this nature.

Records.

- 1. Weather.—Temperature, rainfall, dew and frost; effects of drouth and rainfall on animal and plant life; storms and predictions of weather changes. Use United States Weather Maps.
- 2. Soil and minerals; productiveness of the soil in the spring and summer. Minerals of all kinds collected, named and recorded.
- 3. Plants and animals: The growth and habits of plants and animals should be watched and any peculiarity recorded. Transplant the common wild flowers to the school grounds.
- 4. Prices of articles of trade: Watch variations in prices and ascertain cause.

SEVENTH GRADE.

In this grade the work is finished.

Review.—A running review of all the continents and oceans.

The general circulation of the atmosphere and the distribution of plants and animals.

Mathematical Geography.—The shape of the earth, its measurements, motions, changes of season, solar system, zodiac.

United States.—Review map of the State and pass from it to the map of the United States and North America.

(a) Make map of the United States according to some system.
(b) Contour it, showing the relief forms in full. (c) Draw river systems and locate mining regions. (d) Locate c ties and study commerce of different parts of country. (f) Study history of the United States, including accessions of territory.

Divide the country into sections and study each State in minute detail, and, in connection with it, its history, apportioning the time according to the value of the particular State in the political and commercial history of the United States.

Supplementary Reading.—In this grade there should be much

study of books of travel, history, and descriptive poetry. Magazines and newspapers should be used freely. Gather knowledge from whatever source possible.

Records.—Continue weather records and trace influences of storms. Any unusual phenomena of nature may be noted and causes sought.

APPLICATION OF THE COURSE.

The method is inductive throughout, and is intended to be a close application of the scientific principles of teaching to the subject matter of geography. That this may be accomplished the subject matter is so simplified that it is brought down to the experience of the child, and so arranged that it unfolds before him in harmony with his mental processes. Therefore, to these distinctive features, I desire, in this article, to call attention.

Field Work.—An intelligent basis for the understanding of surface and relief is laid by a series of thoughtful, well-directed lessons in the field. Field work has passed the experimental stage; its practicability has been established by scores of schools during the past few years. It is now a necessity in the proper teaching of geography.

The course provides for the following lessons in the third grade:

1. The surface of the yard.

This lesson is of the greatest importance, since it not only gives most valuable information, but is the introduction to a method which brings to each the responsibility of individual thought. In this lesson the loose materials on the ground should be noticed first, after which study the living plants, as the grass and trees. When both the stems and roots of the grass have been observed, study the soil at the roots of the grass and find it to be composed of sand grains, decayed plants and dark dirt. When a number of observations have been made by the pupils, have a clear, concise statement made, which will embody the entire thought. When a statement has been thus developed, let it be remembered and used later in the summary of the lesson.

2. The street.

Select a street that is not paved, one that has been worked recently is preferable. Observe the hardness, color and texture of

the surface. Notice the scanty vegetation on the sides, and compare it with the vegetation in the yard. Observe the composition of the ground and compare it with the soil in the yard. Study the dust, discuss its formation from the ground of the street.

Make concise statements for summary as before.

3. The contact between the street and the yard.

This lesson, if developed properly, requires considerable reasoning and should be given carefully.

Select a place, if possible, where there is a fresh exposure. If a place having rock at the bottom can be found it is better.

Before approaching this study a vigorous review of the two preceding lessons should be given so that the two ideas should be clear in mind.

Study the top of the exposure and compare it with the surface in the yard.

Study the bottom and compare it with the surface of the street. When the conclusion is reached, that the upper part is the yard surface and the lower is the street surface, the irregular line of contact between the two may be traced. The terms soil and subsoil may be developed and the following definition made: Land surface is composed of soil, subsoil and rock. Statements and summaries may be made as before. After these lessons the term surface, to a child, has a specific meaning.

4. The hill.

The object of this lesson is to give the child a basis for the understanding of relief by a study of its simplest concrete forms.

The work should begin at the summit in order that the concept may grow in the mind as a whole. It should be studied in comparison with the surrounding surface, and the terms summit, crest, slopes and base developed by walking over it and noticing its various modifications.

5. The contour map of a hill.

A contour map of a hill is made by drawing lines along a level at the same vertical distance from the summit. The pupil should be provided with a rough surface map containing roads, houses and other marks that he may be able to recognize. After locating the summit on the map the first contour line should be run while the pupils are on the summit, where the difference in level is plainly

discernible. The development of the first contour line is difficult, but after pupils fully grasp the idea the drawing of the other contour lines will be an easy task, and when completed the map will be indeed a graphic representation of a hill.

6. The surface of the stream basin.

The concept of a stream and its work is best obtained by going to the source of a small stream where the pupil can view from one standpoint the complete adjustment of the different parts of the stream basin.

Study the first (right) slope, its surface, shape and regularity; then the second (left) in the same way. Having found that these slopes meet at the stream bed, study the third (channel) slope noting its sides, regularities and steepness.

Study the collection of water from these slopes into the channel slope, and the work done by the water as it moves over the slopes. Trace the slopes back to the watershed and determine the shape of the watershed.

7. The contour map of the stream.

Begin it on the hill at the highest point and run the contour lines with reference to the channel slope. Any device for locating points on the map may be used. The following is suggested: Divide the map into areas representing three hundred feet square before the pupils leave the school room. Locate the channel slope or stream first and run the contour lines according to the irregularity of the slope. The vertical difference between the contour lines may be five feet if the slopes are gradual, or ten feet if the slopes are steep. These contour lines should be numbered, as they are put in for convenience of reference. The map will then reveal the variations of the landscape to the pupil who has learned to read them until the map will become a real picture of the stream. The advantage of such a representation of surface as this is incalculably great, since it gives, not only the diversity of the landscape, but reveals the exposure to climatic forces in a manner that enables the pupil to tell much about its productive power.

These outlines on the hill and stream are intended primarily for third-grade pupils, but the hints are suggestive enough that the subject matter may be easily extended into the required work of the fifth grade. In the fourth grade a series of lessons is provided for. The Coast Line.

This work should be given on the banks of a pond or creek, or, better, a lake. The surface of the land leading down to the water should be first studied, and then the bank with its irregularities should be considered closely. If the water is clear, the bottom and its composition, together with the channels on the land by which the material on the bottom has been carried down, should be worked out and mapped.

Here is a good illustration of the cutting power of water; and its work in times of wind and calm, rain and drouth should be contrasted.

The coast line having an irregular bank shows very clearly the cape, bay, gulf, isthmus and peninsula. After the study of these, the cutting off of the peninsula by water, thereby forming an island, may be developed easily after the study of the action of water on the bank. The relation of the island to the land, the structure of the island both above and below the water should be studied. The structure of coasts and the formation of harbors are also parts of this study.

In the fifth grade the coast line may be taken up again and pursued further. Particular attention may be paid to the peculiar shapes of the banks around the body of water and their adjustment to the water. The study of the body of water should be extended also, and the development of waves and tides will naturally follow.

Books and Pictures.

Another distinctive feature of this geography is the extended and continued use of reference books and pictures. The reference books should include stories of labor, of travel, of industry, of animals, and many others connected with every phase of the work of geography.

The best books that I know of for the elementary grades are the stories of travel, industry, etc., by the Educational Publishing Company of Chicago, Ill. In addition to this the teacher should collect articles from newspapers and magazines.

But not the least agency is the collection of pictures by both teacher and pupils and pasting them on cardboard for use in the

class at the proper time. The wide-awake teacher can collect hundreds of these in a short time, and their value will be found incalculably great. But the greatest good may be obtained from them only by arranging reading, pictures and class work so that each may supplement the other. The child is thus made a gatherer from far and wide and a discriminator by which all things learned are classified.

Plants and Animals.

This course insists upon the study of plants and animals as such in order that the pupil may have an intelligent conception of their value in the economy of nature and of commerce.

To pursue this work properly the teacher and pupil must be collectors and after the collection is made the study follows closely the trend of the special as well as the general development of the subject.

Specimens of animals almost, if not quite, sufficient for the school can be collected near the school room. These may be supplemented by pictures and stories that will supply the deficiency.

Plants illustrating food and raiment products may be gotten at small cost. Teachers may get information about where to obtain these by addressing Professor Eugene E. Dodd, Carthage, Mo.

This work is given much attention in the third, fourth and fifth grades, for these two elements form the chief basis for commerce and history.

Compositions.—Perhaps this course does not differ more in any particular from ordinary courses than in its provision for systematic language study. The child writes compositions at least twice each week on some phase of the subject under consideration. This he does at a time when he is fullest of the subject and the thought is in most tangible form for expression. This not only cultivates a good vocabulary and a fluent expression but it makes his knowledge more his own possession.

It is believed that this is one of the most valuable features and that it will commend itself to all teachers who have felt the need of a revival in geographic teaching.

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PHYSIOGRAPHIC TYPES.

A brief account of the topographic maps published by the U.S. Geological Survey has already been given in the JOURNAL (Sept., 1897). It is gratifying to the Editors to know that the maps have in this way been brought to the attention of certain schools where they were unknown before, and where they are now doing good service. At a cost of two cents apiece when bought by the hundred, the maps must certainly gain a very extended use. It is the purpose of the Survey to keep a full and complete stock of map sheets; so soon as the number of copies of any particular map is reduced to a certain limit, additional copies are ordered printed. The only exception to this rule will be in the case of a few maps that are withheld temporarily for revision.

The Geological Survey has lately issued the first folio of a Topographic Atlas of the United States, containing ten maps with explanatory text by Henry Gannett; the folio being entitled "Physiographic Types." We predict that this folio and its successors will exert a most favorable influence on the development of scientific geography in the schools of the country, and we urge all progressive teachers to secure a copy of the folio now issued at an early date. Its cost is twenty-five cents.

An introductory statement informs us that the progress of the topographic map of the country, 600,000 square miles being now covered, has led the Director of the Survey "to propose the publication of an educational series of folios, for use wherever geography is taught in high schools, academies and colleges. Authority for their publication and sale was granted by Congress in an act approved March 2, 1895. This, the first folio of the series, presents in ten maps the illustrations of some of the simplest and most characteristic types of topography to be found in those parts of the United States which have thus far been mapped. Succeeding folios will illustrate more complex forms."

The typical areas here represented are as follows: the Fargo sheet, showing part of Red River plain of Minnesota and North Dakota; this is selected as an illustration of a region in topographic youth; Charleston sheet, West Virginia, represents a well dissected

plateau, characteristic of topographic maturity; Caldwell sheet, Kansas, shows a greatly denuded region, now of moderate relief, thus exhibiting the features of topographic old age; Palmyra sheet, Virginia, covers part of the Piedmont uplands, once a lofty mountain belt, then through ages of denudation reduced to an almost featureless lowland, not long ago elevated, and hence to-day dissected by the narrow valleys of revived streams; this illustrates a rejuvenated region; Mount Shasta sheet, California, represents a young volcanic mountain, moderately dissected by radial ravines, but still retaining much of the conical form given to it by long continued eruptions; Eagle sheet, Wisconsin, contains a characteristic part of the glacial moraine formed around the Green Bay lobe of the Great Northern Glacier; Sun Prairie sheet, Wisconsin, shows a large number of the drumlins that frequent the region within the morainic belt previously mentioned; this being the most remarkable group of drumlins in the world as far as now explored, and not likely to be exceeded in the explorations of the future; Donaldson sheet, Louisiana, gives an excellent illustration of the flood plain of the Mississippi; Boothbay sheet, Maine, cannot be improved upon as representing a ragged coastline, produced by the partial submergence of a rugged land surface; Atlantic City sheet, New Jersey, presents a "barrier beach" coast; that is, a low plain bordered by a sand reef enclosing a marshy lagoon.

The lessons that may be taught by the use of this folio are among the most important that the student encounters in the careful study of physiography. All the forms here illustrated are presented as the results of processes, and not as ready-made articles, into whose origin the geographer need not inquire. importance of time as an element in geographical descriptions is clearly brought forth by the first three sheets, which make so clear a contrast between the features of topographic youth, maturity The relation of the processes of denudation to their and old age. controlling base level is well exhibited in the fourth number, where elevation after almost complete denudation has permitted the formation of a new system of valleys; the surface being thus made young again, or rejuvenated. A better example of volcanic action cannot be found in this country than the majestic cone of Mount Shasta. The great importance of glacial action as contributing to existing geographical features is brought forward in the sixth and seventh numbers. The eighth number is not systematically connected with the others, but represents a type of form that fully deserves recognition in the series. The outline of the coast, where the land dips under the sea, varies greatly according to the form that the land had before the present position with respect to sea level was assumed, and according to the amount of change that has since been produced by waves and rivers; the coast of Maine is typical of a partly drowned region, slightly affected by sea action afterwards; the coast of New Jersey is typical of an elevated coast region, distinctly modified by subsequent wave action. Much profit must follow from the use of such examples as these in geographical classes.

The text accompanying the maps leaves the lower half of the fourth page blank. Hence it may be suggested that in a later edition several slight expansions might be made in the explanations without enlarging the folio or materially increasing its cost. example: The argument for the peneplanation of the Piedmont district in Virginia might be strengthened if the crystalline texture and disordered structure of its rocks were considered as well as their age. The crystalline texture is the product of deep-seated processes and thus implies a great denudation by which the present surface has been worn down upon the once deep-seated rocks. disordered structure implies the production of a correspondingly uneven form during the period when the disorder was produced by the deformation of the earth's crust; and, to-day, the absence of significant relief above the general Piedmont level, as well as the entire lack of sympathy between form and structure, find explanation only by base-levelling. Again, at the close of the account of the rejuvenated Piedmont district, it might be stated that the dissected plateau of West Virginia, already described as in the stage of maturity, and by implication in its first cycle of denudation, is really in at least its second cycle; for the surface indicated by its sky line was an old peneplain and not a young plain before the present system of valleys was eroded.

Certain re-statements might be made to advantage in the account of the Boothbay sheet, for there is room for difference of opinion regarding the description and explanation of its features. Ex-

plicit statement should be made of the youthfulness of this coast line, in order that the reader may learn that shore lines as well as land surfaces may be characterized by such terms as young and mature.

The ground for greatest satisfaction in the issue of this folio is in the recognition thus given by a great national scientific bureau of the importance of scientific methods in geographical descriptions. Nowhere have these methods received greater contributions than in the reports and monographs of the Geological Survey; but these elaborate and more or less technical publications have not had for their prime intention the establishment of correct geographical methods, and they cannot be expected to come within the reach of high school classes. The present folio has the establishment of sound methods of geographical illustration and description for its prime object; it is essentially elementary in style of treatment and it may be easily acquired and appreciated by teachers and students in high schools. Hence its great educational impor-Moreover, the authoritative stamp of the National Geological Survey will give an emphasis to the importance of modern physiographic methods in geographical descriptions that could hardly be gained in any other way. Progressive teachers, desirous of using new methods but finding little support from conservative superintendents, will certainly find able allies among the "Physiographic Types."

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NOTES.

Wine Production in France.—The total yield in all departments was 727,791,245 gallons; total acreage, 4,222,325 acres.

All of this product, except about \$10,500,000 worth, is common wine, drunk by the people, bought in the vineyards or their immediate vicinity. The use of wine at the table is deemed as necessary as bread. It is brought within the reach of the most limited purse and daily consumed by large and small families. For my man-of-all-work and his wife, five children and mother-in-law, one case of wine is purchased every three and a-half months. It con-

tains about 215 quarts, and costs, at the dealers near the vineyard, 70 francs (\$13.50); the tariff demanded at the city gates being 28.10 francs (\$5.40). In many families the consumption per day is about one quart for each grown person.

The Moniteur Vinicole stated some weeks ago that the quantity of wine made from alcohol in 1897 was 37,684,760 gallons. The wine from dried grapes (raisins secs) was estimated at 23,458,560 gallons. The alcohol product is formed in this manner: After all the wine has passed from the grapes the residue is left in the vat a few days, when a quantity of sugar and water is added. Alcohol is thus generated, and a variety of wine called "piquette" or "la seconde cuvée" is made, which is sold as one of the varieties of vin ordinaire.

The wine from raisins is manufactured from grapes imported from Algeria, Tunis, Corinth and (a small quantity) from Spain. The aggregate importations for 1897 were 42,000,000 pounds. The Government has recently increased the duty on dried grapes and upon wine produced from them, according to the degree of alcohol contained therein.

Of the total quantity of wine produced in France, nearly one-third comes from the departments of the Hérault; and this, with the three adjoining departments—the Aude, the Pyrénées-Orientales, and the Gard—produces nearly five-eighths of the whole. The report shows a notable decrease in the yield throughout the Burgundy vineyards; the departments of the Yonne, the Haute-Sâone, the Sâone-et-Loire, and the Côte-d'Or having produced only about a third of the 80,000,000 gallons which they yielded in 1896. The district known as the Charente yielded barely 7,000,000 gallons last year, against 300,000,000 before the incursions of the phylloxera. The most flourishing vineyards in the country seem to be in the district from which I write—the valley of the Rhone—where the grape grows in abundance and a good healthful article is afforded to the working classes at nine and ten cents per quart.—Consular Reports, May, 1898.

The Philippine Islands.—Local and European authorities estimate the area of the Philippine Islands at 150,000 square miles, and their population at from 8,000,000 to 10,000,000. The

island of Luzon, on which the city of Manila is situated, is larger than New York and Massachusetts, and has a population of 5,000,000; and the island of Mindanao is nearly, if not quite, as large. There are scores of other islands, large and very populous. An idea of the extent of the Philippines may be formed when it is stated that the six New England States, New York, New Jersey, Maryland and Delaware have 10% less area. In addition to the Philippine Islands, the Caroline, Ladrone and Sulu groups are considered under the jurisdiction of this consulate (Manila).

In all, there are about two thousand islands in a land and sea area of about 1,200 miles of latitude and 2,400 miles of longitude.

During the quarter ending December 31, 1897, there were exported from these islands to the United States and Great Britain 216,898 bales of hemp (280 pounds per bale), of which 138,792 bales went to the United States and only 78,106 bales to Great Britain. During the year 1897 there was an increase in the export of hemp from the Philippines to continental Europe of 19,741 bales; to Australia, 2,192 bales; to China, 28 bales; to Japan, 2,628 bales; and to the United States, 133,896 bales—a total increase of 158,485 bales, while to Great Britain there was a decrease of 22,348 bales.

Thus of increased shipments from the Philippines, those to the United States were 54% greater than to all other countries combined.

Of the total exports of hemp from the Philippines for the ten years ending 1897, amounting to 6,528,965 bales (914,055 tons), 41% went to the United States.

During the same years the Philippine Islands exported to the United States and to Europe 1,582,904 tons of sugar, of which 875,150 tons went to the United States, 666,391 tons to Great Britain, and 41,362 tons to continental Europe; showing that of the total exports more than 55% went to the United States.

There are about 25,000 Europeans resident in the islands (the total population is nearly 8,000,000), of course, not counting the troops. Some 12,000 are established in the capital, Manila, the center of the colonial government. English, Spanish and German houses are engaged in trade, advancing money to the natives on their crops. Such business methods involve risks and necessitate

large capital in the beginning, but the profits are immense. The land is fertile and productive, and lacks only cultivation. Abaca (manila hemp) is one of the chief sources of wealth of the country. Sugar cane does not give as satisfactory returns, owing largely to the ignorance of planters. The average production is 178,000,000 kilograms (175,186.96 tons), while that of Cuba is equal to 720,000,000 kilograms. The sugar goes almost entirely to Japan, England and the United States. It is of poor quality and very cheap. The cultivation of tobacco is one of the most important industries, although it is capable of much greater development. The native coffee, although not equal to the mocha or bourbon varieties, has a fine aroma. It goes chiefly to Spain. Cocoa trees grow in abundance, and the oil is used for lighting houses and streets. The indigo is famous for its superior qualities. The inhabitants are apathetic to a degree that is noticeable even in these countries, where everyone is averse to exertion. women have long and slender fingers, remarkably fine and sensitive and well adapted to their work. The hats and cigarette holders they make and the articles they embroider are models of delicacy. Cotton spinning and work in bamboo are among the chief industries.—Consular Reports, June, 1898.

The High Plateaus and Steppes of Algeria.—It is usual to divide Algeria and Tunis into three zones, the Tell, the high pla-This division Professor Augustin Bernard teaus and the Sahara. condemns. The natives, he says, distinguish only the Tell and the Sahara, the names relating only to forms of relief. He himself uses the term Tell for the region cultivated or capable of cultivation, while the Sahara is in general barren. Between the two occur what should strictly be called steppes. As the terms applied to certain forms of elevated land have been used very loosely, Professor Bernard defines (1) highlands (haute terre) as a region of considerable mean altitude; (2) platform, as a country where the strata are horizontal without folds; (3) elevated plain, as a level surface produced by the filling up of depressions with alluvium; and (4) plateau, as a plain due to erosion and abrasion which have removed the inequalities.

The chains of Algeria and Tunis have no connection with those of

Morocco, as has often been stated, but are of later date. The relief is formed by two series of folds, the Tell Atlas and the Saharan Atlas. The calcareous chains were raised chiefly in Tertiary times (Miocene), and have been forced by lateral compression against the older rocks, of which some traces are to be seen on the coast, particularly in Eastern Algeria. At many points between these folds occur elevated plains, formed of Quarternary and recent alluvium washed down from the surrounding mountains. They show that North Africa has passed through periods of great humidity, followed by periods of drought. Had the humidity continued, the streams would probably have found their way eventually to the These elevated plains occur between the Atlas and Middle Atlas in the Dahra of Morocco, are continued in the plains of Oran, with an altitude of 3,300 to 3,900 feet, gradually change their character in the region of Zahrez, where they are intersected by more numerous ridges, and, diminishing in elevation, terminate at the basin of the Hodna, only 1,300 feet above sea-level. are numerous other smaller plains, and even in Central Tunis some are to be found; but here the waters have succeeded in making their way towards the sea through the Medjerda basin, and the rainfall is heavier. There are, then, in this country no true plateaus, such as the Spanish meseta or the central plain of France. The whole surface is covered by a series of mountainous folds running east and west, between which lie elevated plains, extending in the same direction, but not forming an interrupted succession.

Steppes are lands where the water supply is insufficient to maintain forest vegetation. The soil produces only bulbous plants and grasses, which die down in the dry season. Steppes, then, occupy an intermediate position between cultivable lands and deserts, and are, like the latter, the result of the climate. In north Africa they may be said to be the regions where the mean annual rainfall ranges from 6 to 12 inches. With a fall of less than 6 inches the country is a desert, while with more than 12 inches it can be cultivated. The steppes, then, are the land of sheep-feeding. The principal plant is esparto grass, though considerable tracts are covered with other kinds of vegetation. As the rainfall diminishes with the distance from the sea, we expect to find a zone of steppes extending east and west through Algeria and Tunis, between the

Tell and the Sahara. They may easily be confounded with the elevated plains, because the latter favor the development of steppes when shut in by mountains, or, at least, sheltered from the moist Nevertheless, the elevated plains and steppes are by no means identical, for many circumstances regulate the rainfall in North Africa. Distance from the sea is only the chief factor; the fall increases from west to east, and Eastern Tunis, bathed by the sea, is influenced by special conditions. In a subordinate degree the composition of the soil and the depth of vegetable earth also contribute to the result. The climatic conditions of the steppe may accordingly be found elsewhere than on high plateaus, while some high plateaus may remain capable of cultivation. At the edge of the Sahara the steppe stretches up the sides of the mountains, in some places extending ever the summits. plain of Sétif and the patches of high lands in central Tunis are excellent for wheat, while the plain of Chélif does not every year receive rain enough to produce crops, and is almost a steppe. Farther east the plains of Angad and Trifa, the desert of Garet, allow the vegetation of the Sahara to advance to the coast.—Bull. de la Soc. de Géographie d'Oran, Trim. 1, 1898.

Austria.—One of the most remarkable countries on the globe is Austria, or as it is politically called, Austria-Hungary. men or Britons all the world over understand each other, wherever they meet; Frenchmen, Germans, Italians and Russians can do the same; but if an Austrian belonging to Bohemia, a northern province of Austria, happens to meet another Austrian born in Dalmatia, a southern province of the empire, the former will try in vain to make himself understood in Chech, a Slavish language, and the latter will rarely be understood in his Italian tongue; and if an inhabitant of the Tyrol, a western province of the country, speaks his German to the man from Bukowina, in the east, who speaks Rumain, the latter will hardly understand him; in fact, two men from provinces joining each other but seldom converse in the same language. Even the present Kaiser, Francis Joseph, himself an eminent linguist, is not able to master all the languages his subjects are daily speaking.

The climate, too, differs in character just as much as the lan-

guages spoken by the people. In the north, in Bohemia and in Galicia, the winter is extremely cold, often many degrees below zero; while at the same time the southern portion of Dalmatia or Trieste enjoys such mild winters that snow is as rare as it is in South Australia.

If you look at the map, you will find the Danube (next to the Volga), the largest river on the continent of Europe, passing first from west to east, and then at Pressburg turning from north to south. Here begin the Danube Plains, the most fertile country in middle Europe, and it is the river Danube which makes Austria, or rather Hungary, one of the great wheat, wine and produce suppliers of the world; its products find a large market in England, and even in America.

Before the introduction of railways the Danube was the principal waterstreet by which goods and western culture found their way into the minor Asiatic provinces.

Austria has three distinct mountain ranges. The Alps, coming from Switzerland, pass through the entire Tyrol, and form some of the prettiest valleys and gullies, which are the delight of tourists. The portion of the Alps which passes through Krain and Istria, two southern provinces of the empire, is called the Karst; but these mountains are perhaps better known as the Julian and Dinaric Alps; the latter very interesting range runs down through Dalmatia into the neighboring provinces of Turkey.

The next group of ranges are the mountains surrounding Bohemia on the north and west, which are called by several hard names with which I need not trouble you.

The third group is the Carpathian, which forms the boundary between Galicia and Hungary.

There are four distinct nationalities and languages in Austro-Hungary: German, Slav, Rumain and Magyar, but the Slav and Rumain have many variations or dialects. The proportion to the population is as follows: About ten millions of Germans, sixteen millions of Slavs, nine millions of Magyars, three millions of Rumains and two millions of Italians and others.

With the exception of four millions of Protestants, half a million of Jews and about two millions of Greek Catholics, all the population of Austria-Hungary is Roman Catholic. The latter re-

ligion is the religion of the reigning family, and, therefore, the State religion.

Austria-Hungary is self-supporting in all articles of food, and is capable of exporting a great deal of wheat, wine and timber, and the mines, which all belong to the State, produce almost all kinds of minerals except gold, which, unfortunately, is not found in any considerable quantity, although Bohemia has produced some gold for many centuries. The Austrian salt works in Wieliczka, which are worked by the Government, are very extensive, and supply nearly the whole continent of Europe with that commodity. These salt works are Government monopolies and form a great source of revenue.

Styria, Bohemia and Moravia are very rich in coal and yield more than sufficient to supply all the large industries with this important article.

Although Austria is chiefly an agricultural state and very rich in nearly all the products of the soil, it has also very extensive and varied industries, especially in articles of art.

The chief art industries are located in Vienna, where numerous articles are made of gold, silver, leather, etc. These articles are often sold as having been made in Paris, but as a rule they surpass the Paris-made articles, especially in price. Bohemian glassware has made a great name for itself, and has always formed a very great attraction in all the world's exhibitions.

Austria is very rich in mineral waters and hot springs. The celebrated Carlsbad and Marien baths in Bohemia are visiting places for suffering humanity of all nations and it is generally admitted that these places are the best summer resorts for invalids, and they have become quite famous for the number of sufferers who have been cured by their waters.

You all know the bentwood chairs made in Austria and sold all over the world. Hundreds of thousands of people are getting their livelihood out of this industry. Nearly all meerschaum pipes are also made in Austria and distributed throughout the whole world.

Most of the beet-root sugar introduced into England and the colonies comes from Austria.—Children's Hour, Adelaide, Australia.

Mont Blanc.—Probably ninety-nine persons in a hundred, if asked to what country Mont Blanc belongs, would answer Switzerland. As a matter of fact, it belongs chiefly to France and Italy, the boundary line passing across its summit. The northern part of the Mont Blanc chain, however, belongs to the Swiss. A writer in the French periodical Nature gets quite indignant at the apparent disposition shown by the Swiss in their guide-books and at expositions to claim Europe's highest mountain as their property.—Evening Post.

Mongolian Carpets.—To-day I examined the carpet factories for which this place has been famous for centuries. The wool is bought from the Mongols, and each manufacturer dyes his worsted for himself. I found it difficult to obtain very accurate information about the origin and nature of the dyes used. Brazil wood supplies a red dye, huai-tzŭ (seed of the Styphonolobium Japonicum, according to Williams), a yellow dye, safflower is also used, as is a red dye said to come from Tibet, and which is possibly the ts'o of the Tibetans. Another plant here called tzŭ hua-tzŭ (tzŭ meaning "purple") supplies a light drab, and indigo furnishes them their blues. Aniline dyes, I was sorry to find, have found their way into the Ning-hsia market, but are not much used in dyeing wools for carpets, except for supplying purple. The green colors used come, I was told, from the East (probably Shanghai), and are, therefore, I presume, of foreign origin. The manufacturers only dye their wools in summer. In company with Mr. Horoben, of the China Inland Mission, I visited a number of the factories (there are sixteen in the city), in most of which we found between six to ten looms, at which both men and women worked. The looms, of the most primitive description, are vertical, and the warp is passed over two rollers. The woof is passed in between two threads of the warp without the aid of any instrument, the wool being simply rolled in a ball, and is cut off roughly with a rather blunt knife. When a whole line has thus been put in, it is trimmed with a pair of shears. There is no pattern before the weaver, but he evolves the most intricate and tasteful designs without their assistance or a moment's hesitation.

I found that many manufacturers were copying very common

patterns of European ingrain carpets. These were to fill orders given them by various officials who had brought here bits of carpet bought at some of the treaty ports. The usual size of the rugs is that necessary to cover a k'ang, say ten feet by six. Prayer rugs, cushions, saddle blankets, etc., are made in larger numbers than any other style of rugs, as nearly all of them are sold to Mongols or go to Tibet. Besides rugs, Ning-hsia manufactures a good quality of paper, and here the industries of the place cease.—

Diary of a Journal through Mongolia and Tibet. Rockhill.

REVIEWS.

Ethnology (Keane). Geographical Distribution of Mammals (Lydekker). History of Ancient Geography (Tozer). Cambridge Geographical Series, Cambridge, England.

These three volumes form part of the admirable Cambridge Geographical Series, and the names of the writers are a guarantee that they are accurate, scholarly and modern. They are not, of course, text-books for schools, but they form desirable, and almost necessary additions to any library intended for the use of teachers and upper forms. At the present time increased prominence is rightly being given to human geography, and the first book is indeed almost indispensable to the teacher. Teachers will find Professor Keane's book valuable in enabling them to supplement and correct the meagre and often misleading statements of too many school text-books. Some experts may not admit all of his conclusions, but so many ethnological theories are tentative, that this would have been the case with any other author. The chapters on the Primary Ethnical Groups, and especially that on the Caucasian race, are of special interest. Professor Keane rightly deprecates the use of Aryan as a racial term, though willing to retain it in its linguistic sense, and he does well throughout the book to emphasize the difference between the two.

Mr. Lydekker's volume is hardly so useful to teachers of geography as its companion volumes. Like everything from Mr. Lydekker's pen it is an admirable piece of work, but the geographical interest is subordinate to the zoölogical.

Mr. Tozer's History of Ancient Geography is admirable either for the teacher or the advanced student, especially when geography is taken up side by side with classical studies. "As geography is the most central in its position of all the sciences, standing as it does halfway between history, sociology and the other sciences which relate to man on the one side, and those which deal with the composition of the earth which is his dwelling place on the other, so the history of geography, especially that of its earlier stages, when these cognate subjects were still in their infancy, is fruitful in information relating to them." These words of Mr. Tozer's indicate to how wide a circle of readers his book appeals, and sufficiently justify its inclusion in a geographical series.—F. D. H.

Northern Europe. By Chas. F. King. The Picturesque Geographical Readers. Lee & Shepard. 1897. Vol. VI. Pp. viii+352.

The latest volume in the well-known series of geographical readers bearing Mr. King's name is to our mind the best. It is a welcome addition to our school literature on the geography of Northern Europe. The book treats of the experiences of a party starting from New York and making a trip by rail and carriage through Ireland, Scotland, England, Norway, Denmark, Sweden and Russia. A great deal of general and interesting information is given in such a way as to make a lasting impression upon the reader. The salient and practical points are brought to notice more particularly, and much that is of general interest is woven into the geographical matter. For instance the map of London, explaining the abbreviations E. C. and W. C., that are common on foreign letters, and the paragraphs explaining the origin of many common phrases and proverbs, are very helpful even to elders. The subject matter has been well chosen.

The illustrations are far superior to those usually found in such books. The features chosen for illustrations are many of them new, and few of them hackneyed. The quality of reproduction is most commendable.

The only displeasing thing to an ordinary reader is the general opinion one gets of the traveling party whose diary is supposed to be edited in the book. Surely it must be a bit tiresome to have

some one woman always ready to quote the most pertinent bits of poetry; and a boy who is ever prepared to present perfectly exact statistics is somewhat of a paragon. This fact that the travelers were all perfectly prepared to "do" every place and get the most from their travels, gives a certain unnatural air to the narrative that is a bit discouraging. Perhaps a child will, however, wonder and praise, where elders would wonder and be skeptical.

The book otherwise is very pleasing to an adult and ought to win its way in the school world.

R. E. D.

CURRENT LITERATURE.

- Bulletin of the American Geographical Society, New York. No. 4, 1898. Littlehales, The United States Mid-Pacific Naval Supply Stations; Sears, Geographic Conditions that make Great Commercial Centers.
- Geographical Journal, London. October. Holdich, Tirah; Hobley, Kavirondo; Beazley, Nordenskjold; Geography at the British Association, 1898; The Swedish Arctic Expedition; Church, Argentine Geography and the Ancient Pampean Sea; Reclus, A Great Globe.
- National Geographic Magazine, Washington. October. Gannett, Lake Chelan; Newell, Mesa Verde; McGee, The Geospheres.
- Scottish Geographic Magazine, Edinburgh. October. Murray. The Scientific Advantages of an Antarctic Expedition; Taylor. A History of Antarctic Discovery; Chumley, The Fauna and Flora of the Antarctic; Bartholomew, Antarctic Bibliography.
- Société de Géographie Commerciale du Havre, Havre. 3d Trimestre. Lièvres, Travels in Japan and Korea; Dafert, Actual State of the Coffee Culture in Brazil; The Inauguration of the Railway in the Congo.

Vol. I.

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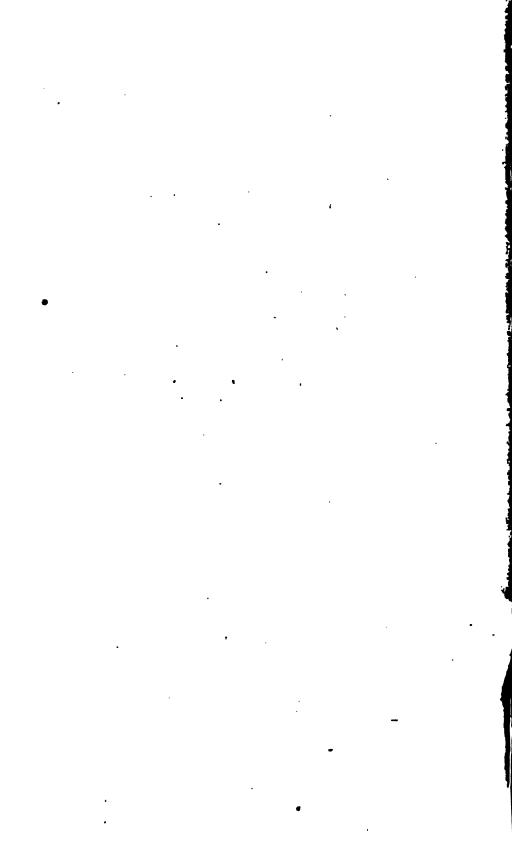
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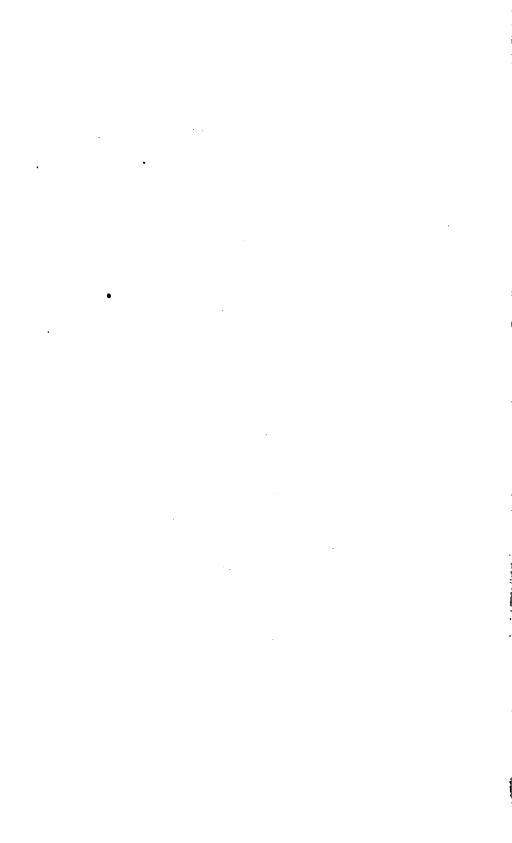
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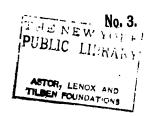
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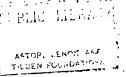
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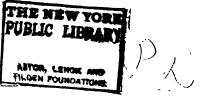
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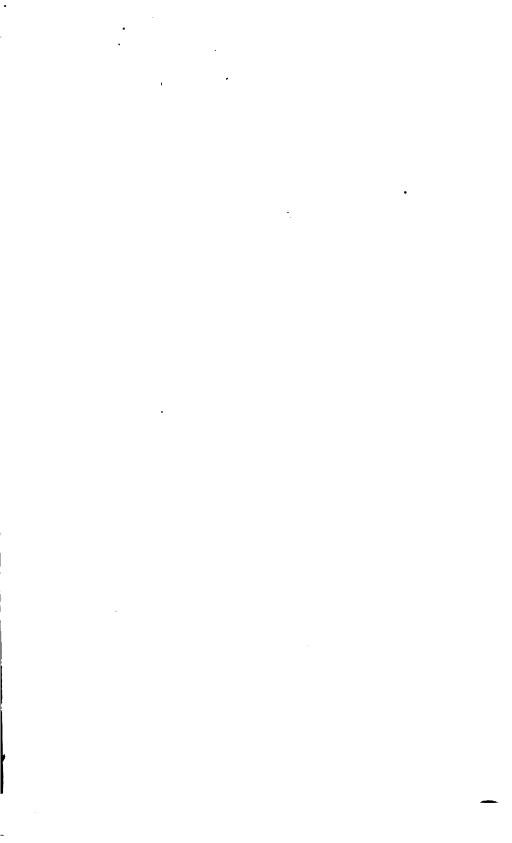
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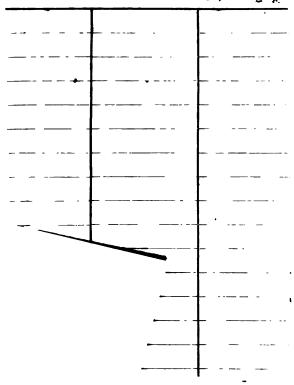


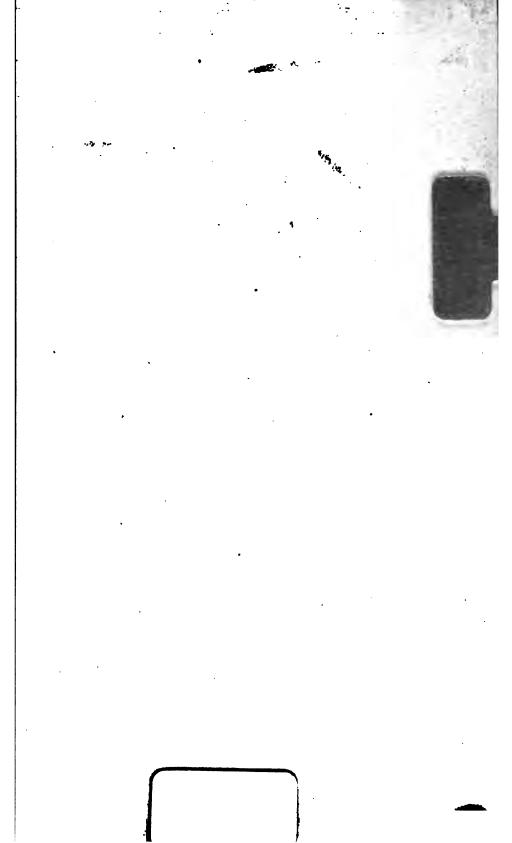
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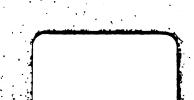
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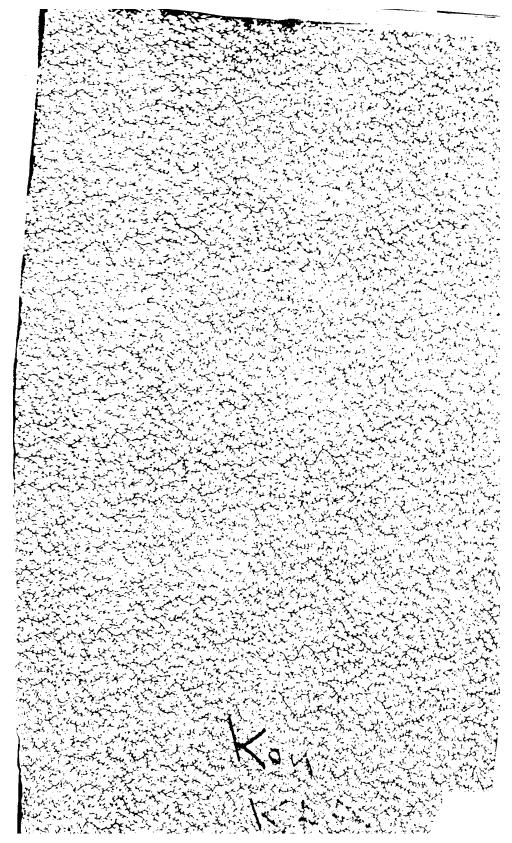
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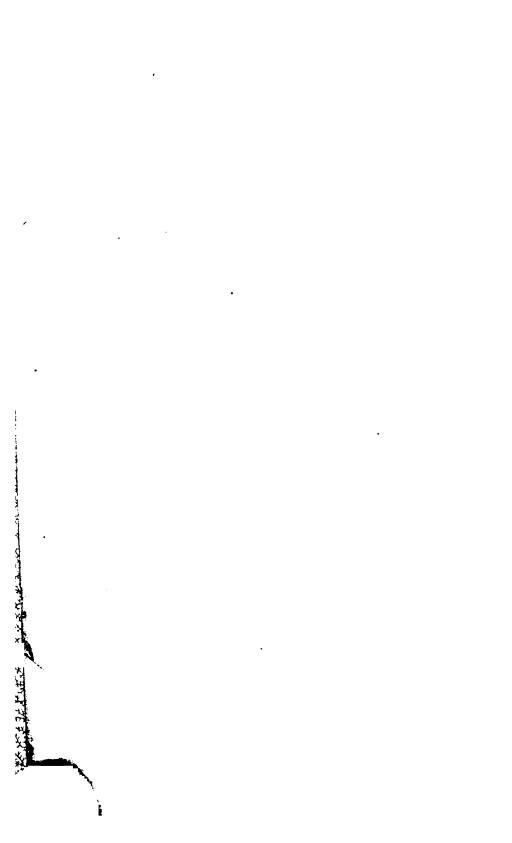


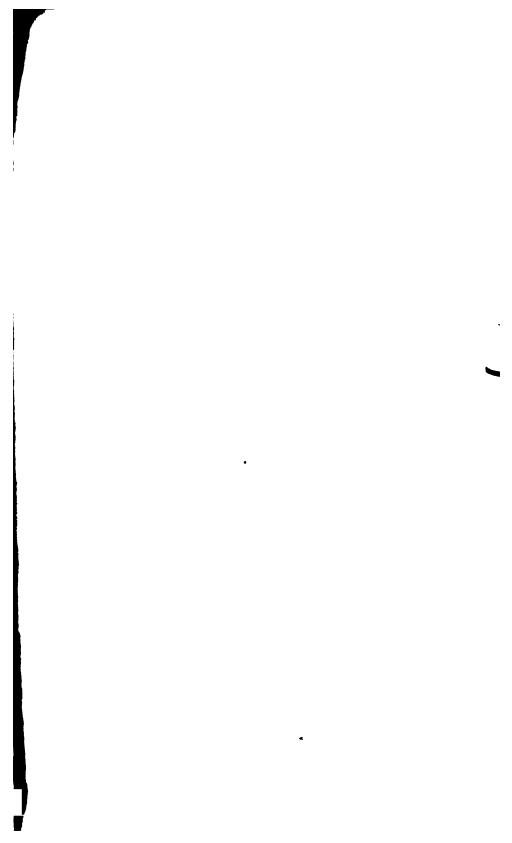


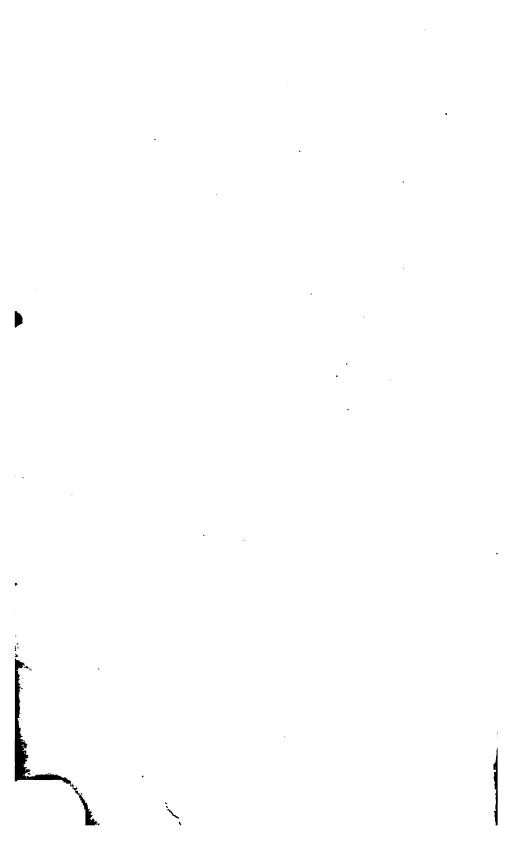












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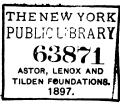
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- , 3. Zeeland in de 2de helft der 13de eeuw, volgens een kaart in 't archief van Gent.
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- " 5. Hydrographische kaart der Zeegaten van Goeree en de Maas, door J. C. Rijk, 1823, herzien door A. van Rhijn in 1839.
- , 6. Schouwenbank met de buitengronden en zeegaten van Walcheren tot den Hoek van Holland.
- , 7. Schets- en overzichtskaart van het beloop der rivieren Manda, Igal, Plandok, Gaoeng, Indragiri en Reteh, door H. B. de Boer.
- , & Schetskaart van de Batang Kwantan of Indragiri-rivier van af P. Petanggan tot Kg. Pranap, door H. B. de Boer.
- , 9. Schets van een denkbeeldig terrein, bewerkt in den geest der Waterstaatskaart, door P. A. van Buuren.
- "10. Kaart van Westerwolde, I Bodemgesteldheid. II Plantbekleeding, door Dr. H. Tonkes.
- "11. 1. Talaga Bodas. 2. Kawa Manuk b. Daradjat.
- , 12. Schets van den tocht van Pâre Pâre naar Palima, Zuid-Celebes, door A. Wichmann, 1889.

Ceres-profiel naar Geddes Bain, Rubidge, Cohen en Gurich (bij p. 586) Geologische schetskaart van de Zuid-Afrikaansche Republiek, naar Duni (bij p. 608).

Geologische schetskaart van de Zuid-Afrikaansche Republiek, naa: Schenck (bij p. 608).

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Stanley's route (bij p. 387). De meren in Oost-Afrika (bij p. 406). De reizen van Arnot (bij p. 412). Drie photographieën: Raad van Toeal twee panorama's van Toeal (bij p. 499). De vereeniging der Ratum sche met de Henxelsche beek (bij p. 532). De Groenloosche Slinge (bij p. 533). Kruising van wegen (bij p. 534). Schetskaartje van de Indragiri tusschen P°. Petanggan en Kg. Pranap (bij p. 573). Profie door de Transvaal (p. 609). Doorsnede over de Kimberley-mijn (p. 614). Ligging der diamantmijnen in Zuid-Afrika (p. 617). Bovenvlakte van het veen op 3 M. à 3,50 M. + A. P. (p. 774). Schetsplaatje van het Roode Klif (bij p. 781). Profiel op de schaal van 1 op 19 (p. 785). Ideale doorsnede van het Roode Klif (p. 798).

De REDACTIE brengt, bij het verschijnen der eerste aslevering van den nieuwen jaargang, ter kennis der lezers van het tijdschrift, dat er eenige wijziging in de inrichting daarvan is gekomen; de splitsing in "Meer Uitgebreide Artikelen" en "Verslagen en Aardrijkskundige Mededeelingen" is vervallen. Er zullen voortaan asseveringen worden uitgegeven met doorloopende nummering en pagineering voor elken jaargang. De omvang van het tijdschrift blijst bepaald op zeventig vellen druks per jaar.

De reden dezer verandering is gelegen in het bezwaar dat de schifting der stukken opleverde, met het oog op de vraag, in welke rubriek zij moesten worden opgenomen; ook in verband met de meerdere of mindere wenschelijkheid eener spoedige publicatie. Het is dan ook, gelijk den lezers gebleken zal zijn, herhaaldelijk voorgekomen, dat vrij migebreide opstellen in de afdeeling "Mededeelingen" werden opgenomen en daarentegen beknopte berichten of mededeelingen onder de "Meer Utgebreide Artikelen" eene plaats vonden.

Er kan slechts ééne aflevering tegelijk in bewerking zijn; en wanmeer deze bijv. uit 300 pp. bestaat, duurt het vrij lang voordat zij gereed is en eene andere ter perse gelegd kan worden. Ook bij het aanhalen van het tijdschrift was die splitsing zeer lastig; voortaan zullen
aleen de jaargang en de bladzijde behoeven te worden genoemd.

De afdeeling "Verslagen en Aardrijkskundige Mededeelingen", heeft bovendien in de laatste jaren haar oorspronkelijk karakter nagenoeg geheel verloren; de beknopte mededeelingen aangaande belangrijke gebeurtenissen op geographisch gebied, zijn gaandeweg veranderd in geregelde stelselmatige overzichten van reizen en publicaties en in het vorige jaar zijn deze tot één geheel samengesmolten in het overzicht der vermeerdering van de kennis des aardbols.

Deze eerste aflevering bevat een artikel van Dr. B. Hagen, dat in de Duitsche taal en in zijn geheel wordt gepubliceerd. Zoo spoedig mogelijk volgt de tweede aflevering met opstellen en mededeelingen van verschillenden aard.

DE REDACTIE.

MEINEM VEREHRTEN FREUNDE

HERRN DR. F. A. JENTINK,

DIRECTOR DES REICHSMUSEUMS FÜR NATURGESCHICHTE

IN LEIDEN,

DER SICH UM DIE CONSERVIRUNG UND WISSENSCHAFTLICHE BEARBEITUNG MEINER SAMMLUNGEN SO UNSCHÄTZ-BARE VERDIENSTE ERWORBEN,

ALS SCHWACHES ZEICHEN MEINER DANKBARKEIT GEWIDMET.

DIE PFLANZEN- UND THIERWELT VON DELI AUF DER OSTKÜSTE SUMATRA'S.

NATURWISSENSCHAFTLICHE SKIZZEN UND BEITRÄGE

VON

DR. B. HAGEN.

GEOGRAPHISCH-KLIMATISCHE ÜBERSICHT.

Die Insel Sumatra ist ihrer ganzen Länge nach von einem Gebirgssystem durchzogen, das aus mehreren parallellaufenden Ketten besteht, welche durch Ouerzuge mit einander verbunden sind und mehrere grosse, ausgedehnte Hochlander einschliessen. Während nun auf der Westseite, die dem ganzen Wogenprall des indischen Oceans schutzlos ausgesetzt ist, der letztere sich bis dicht an die Gebirgsflanken herangenagt und die Bildung grösserer Anschwemmungsgebiete verhindert hat, sind dagegen unter dem Schutze der vorgelagerten malaiischen Halbinsel und der stillen, ruhigen Fluth der Malakka-strasse auf der Ostküste die bekannten, grossen alluvialen Ebenen entstanden, welche in der Gegend des Aequator (bekanntlich halbirt ja derselbe ungefahr Sumatra) am breitesten sind und gegen Norden etwas schmäler werden. Auf diesem nördlichen, schmäleren Theil der Ostküste nun liegt das Terrain, von dem ich im Nachfolgendem sprechen will, und welches ich der Kurze halber Deli nenne, obwohl dasselbe nicht blos das eigentlich sogenannte Sultanat Deli, sondern auch die angrenzenden Reiche Lankat und Serdang, mit einem Worte, das ganze Land zwischen dem Cap Tamian und dem Asahanflusse umfasst. Die Kustenebene hat hier eine Breite von 20 bis 25 Kilometer mit einer sehr geringen Steigung, etwa 1:1000. Das Hinterland Deli's bilden die grossen Hochebenen des nördlichen Tobah- und des Karo-Gebietes, welche. 4000 Fuss über der See liegend, von der Küstenebene durch eine steile vulkanische Gebirgsgruppe geschieden sind, von welcher zwei schwach rauchende Vulkane mit glänzend gelben Schwefelfeldern, der Si-Baja mit ca 2172 M. und der Simanabum mit ca 2417 M. abs. Höhe, als Wahrzeichen hoch auf die waldigen Ebenen Deli's herabschauen. Dieses Gebirge besteht, wie die von mir mitgebrachten Gesteinsproben beweisen, fast durchgängig aus trachytischem Gestein (Andesit).

In den Vorbergen trifft man auch anstehend weissen Porphyr und eine Art Sandstein, letzteren meist zunächst dem Alluvialgebiete. Auf einigen Bergkuppen scheint auch Basalt vorzukommen, wenigstens habe ich einige Stucke desselben als Gerölle in einem von den Höhen des Huta-wajupasses herabstürzenden Giessbach gefunden. An manchen Stellen ist der Andesitbasis öfters eine starke Decke schieferigen, sehr bröcklichen, lebhaft roth und blau gefärbten Thones aufgelagert 1), z. B. gerade an dem ebengenannten Pass von Huta-waju, durch den ein stark frequentirter Weg von der Hochebene von Tobah nach Deli-Serdang herabsuhrt. Diese Hochebene, bis zum Tobahsee hin, scheint mir aus einer dicken Lage vulkanischer Asche und Rapilli mit grösseren Bimssteinbrocken aufgebaut zu sein, welche, von den oben genannten und noch mehreren anderen, theils noch thätigen, theils schon erloschenen Vulkanen herstammend, die ursprünglichen Vertiefungen und Gebirgsspalten verebnet und ausgefüllt haben. Ich konnte dies bei meinen Reisen nach dem Tobahsee verschiedentlich an über 100 Fuss tief eingerissenen Erosionsthalern constatiren 2).

Vulkanischen Ursprungs ist also so ziemlich Alles in dieser Bergkette und ihrer Umgebung; Granit habe ich vergebens gesucht, obwohl mir Pflanzer erzählt haben, dass sie solchen in den Oberländern von Bedagei und Asahan fanden. Und doch muss derselbe irgendwo in Deli vorhanden sein, denn ein grosser Theil des Bodens der alluvialen Küstenebene soll nach in Europa gemachten Analysen aus verwittertem Granit bestehen. Eine Eigenthümlichkeit desselben, nämlich des Bodens, besteht in einer unzähligen Menge kleiner, stecknadelkopf bis erbsengrosser Quarzkrystalle, mit denen er durchsetzt ist, und die, besonders nach einem Regen, wie Diamanten funkeln, so dass die Wege oft blitzen und flimmern, als seien Körbe voll Brillanten darüber ausgeschüttet. In den kleinen, raschströmenden Wasser-Betten der Vorberge häufen sie sich oft so an, dass sie

i) Dieser Thon ist an der Oberfläche zu einer fetten, schweren Lehmerde verwittert, welche von den Batta's in kleinen Kügelchen als bungerstillendes Mittel genossen wird.

²⁾ Cf. meinen Reiserapport in Tijdschrift voor ind. taal- land- en volkenkunde etc., Deel XXXI, Afl. 4, 1886. Nebst Karte.

ganze Bänke bilden, welche rein aus solchen glasartig durchsichtigen, oft gelb gefärbten Krystallkörnern bestehen. Eine andere Eigenthumlichkeit des Bodens ist ein überall vorhandener tiefschwarzer Sand, der ebenfalls am deutlichsten in den Wasserrinnen der Strassen nach einem Regen zu sehen ist und sich auch in den Bächen der Vorberge in bedeutender Menge ansammelt; ich erinnere mich einer Stelle im Oberlauf des Flüsschens Batang Kwis, des Grenzflüsschens zwischen Deli und Serdang, wo derselbe in ungeheurer, abbauwürdiger Menge aufgehäuft lag. Dieser Sand ist ziemlich schwer, doch besitzt er nicht das Gewicht des Zinnsandes; ich halte ihn, und verschiedene Personen, denen ich ihn zeigte, so u. A. der jetzige Resident von Sumatra's Ostküste, Herr Michielsen, sind derselben Meinung, für Titaneisensand; über eine Probe, die ich nach Europa zur Untersuchung gab, habe ich bis heute leider noch keine Diagnose erhalten.

Gold — um dies gleich hier anzuschliessen — wird fast in allen Flüssen Dels und seiner Nachbarländer gefunden, doch in so geringer Quantität, dass ich keinem Goldgräber rathen möchte, hier sein Glück zu probiren. Im Innern der Gebirge jedoch, namentlich im Lankat'schen, müssen sich grössere Lager befinden, die früher von den Eingebornen sogar bergmännisch ansgebeutet wurden; wie ich von einem vertrauenswürdigen Malaien dem alten, nun verstorbenen Fürsten (Dato) von Hamperan—Perak, erfuhr, muss man schon Stücke von Faustgrösse dort gefunden haben. Waschgold bringen die Battas noch hie und da zum Verkause herab an die Küste.

Sodann ist in unserm Gebiet noch bemerkenswerth das Vorhandensein von Petroleumquellen, die besonders im nördlich gelegenen Theile von Lankat ergiebig sind und mit deren Erböhrung behus kaufmännischer Ausbeutung man eben beschäftigt ist.

In der ganzen Küstenebene wird man sich vergebens nach einem einzigen Steine umsehen, ausser dem kleinen, kaum daumengrossen Gerölle in den Flussbetten 1) und einigen zerstreuten Kieslagern im Lande selbst. Das einzigemal, wo ich wirkliche, grössere Brocken gesehen habe, war bei meinem früheren Wohnort Tandjong-Morawa in Serdang, 20 Km. von

¹⁾ Die Grösse und Stärke dieses Gerölles nimmt in den Flussbetten nach dem Meere zu sehr regelmässig ab. Im Delifiusse findet man z. B. in den Vorbergen grosse Felstrümmer, im daranstossenden Theil der Küstenebene nur noch Stücke von Kopfbis Fsustgrösse. In der Höhe von Medan werden diese noch kleiner, und haben bei Mabar z. B. ea 14 Km. von der See entfernt, kaum noch die Grösse einer Nuss; weiterbinab trifft man nur noch Stückehen von Bohnen-oder Erbsengrösse, von Labuan an sauschliesslich Schlamm und Saud.

der See entfernt. Dort bildet die Bodenunterlage ein röthlicher Thon, hie und da durchsetzt mit Schichten eines sehr fetten blauen Thones. Man hat aus ersterem und nicht ohne Erfolg, versucht, Backsteine zu brennen. Beim Ziehen eines Grabens stiess man dort, kaum einen oder zwei Fuss unter der Oberfläche auf ein ca hundert Meter langes Nest stark verwitterter, vulkanischer Schlacken von oft mehreren Fuss Durchmesser, deren Höhe lungen und Poren mit Sand und Detritus angefüllt waren. Sonst is Alles, Alles in der ganzen, grossen Ebene vom Meere bis zu den Bergen angeschwemmter Boden, und gegen die See hin purer Schlamm, und zwat so neuen Datums, dass man noch, über vier Kilometer von der See entfernt, in achtzig Meter Tiefe ziemlich gut erhaltene Holzreste von Kaju niri (Xylocarpus obovatus) und völlig recente Muschel- und Schne ckenschalen findet, wie sich beim Bohren der artesischen Brunnen in Labuan gezeigt hat. Dicht bei meinem Hause, das am oberen Ende des Kampong Labuan über eine geographische Meile vom Meeresstrand ent fernt liegt, trifft man in zwei bis drei Fuss Tiefe noch echten, unves falschten, schwarzen Meerschlamm an von syrupähnlicher Consistenz; all ich einige abgestorbene Muskatnussbäume umhauen liess, entwickelte sich aus den Löchern, welche die herausgezogene tiese Pfahlwurzel hinterlies ein so pestilenzialischer Geruch, dass selbst die mit ausserordentlich geringer Empfindlichkeit der Riechnerven begabten chinesischen Arbeitet sich die Nase zuhielten. Unter diesen Umständen kann es nicht befremden, dass die malaiische Volkssage das Meer einst bis zum Fuss des Gebirges gehen liess, und dass man an den Vorbergen bei Deli-tua (d. i. Alt-Deli) an dem hohen Flussufer noch die Ringe zeigt, wo früher die Schiffe angebunden wurden, und noch viel weniger, dass am Deliflusse bei Kotta-bangon, etwa 8 Km. von der See, nach derselben Sage zwei grosse Prahus im Sande begraben liegen, die letzten, welche so weit heraufkamen, und nicht mehr zurück konnten.

Wir können den Alluvialprocess heute noch fast mit den Augen ver folgen. Noch bei Menschengedenken — für Deli bedeutet das etwa 25-30 Jahre — waren z. B. der Deli- und der Serdangfluss selbst für grössere Schiffe passirbar; der letztere ist jetzt ganz versandet, so dass nur noch Dampfbarkassen bei hoher Fluth einlausen können, und die breite Mundung des ersten, die Kwala-Deli, über welche jetzt eine Eisenbahnbrücke führt, ist höchstens noch zwei Meter tief, also ganz unfahrbar geworden. Der Hasen besindet sich desshalb in einem Seitenarm, dem Belawan. Aus dem Munde des srüheren Assistent-Residenten von Deli, des Herrn Velders, habe ich selbst vernommen, dass er noch 1873 mit einen grossen Gou-

venementsbarkasse bis zum damaligen Controleurhause (mitten im Kammg Labuan) gefahren sei und ich selbst habe 1879 noch "Steamlaunder bei Fluth bis ganz in die Nahe lausen sehen; heutzutage geht das wohl nicht mehr. Man muss aber auch gesehen haben, welche Mengen von Sand und Schlamm alle die zahlreichen Flüsse nach einem guten Regen von dem höheren Land herabschwemmen; das Wasser gleicht dann in der Farbe einem Milchkaffee auf's Haar und bildet, in ein Glas aufgeangen, einen ungeheuren Bodensatz. Ein grosser Theil dieses Schlammes bleibt nun schon auf dem Wege in dem dichten Rhizophorengewirr oder bei der Fluthstauung in dem breiten, trägesliessenden Strome selbst sitzen, ein anderer Theil wird von der Ebbestrom in's Meer hinausgeführt und dort an der "Barre", diesem leidigen Hinderniss aller Kustenschifffahrt, abgelagert, um dann von der rückkehrenden Fluth ebenfalls wieder theilweise am Festland angeschwemmt zu werden. So entstehen langsam, aber steig fortschreitend jene ungeheuren, oft stundenweit sich ausbreitenden Schlammbanke, die bei Ebbe blosliegen und einem grossartigen Gewimmel der mannichfaltigsten Strandthiere zum Tummelplatz dienen, und über die dann die Vegetation mit den Pionieren, den Rhizophoren, an der Spitze, langsam vorrückt, und sie in festes Land verwandelt. Dünenbildung ist an dieser Kuste selten, doch sind deutliche Ansange derselben, z. B. bei Serdang, wahrzunehmen.

Was nun der Fluss unten an der Küste ansetzt, das muss er naturgemäss oben in den Bergen wegnehmen 1); die Gebirgsflanken sehen wir demnach in hohem Grade ausgenagt, erodirt; jeder Bach, jedes Wässerlein hat sich eine tiefe Schlucht gefressen, in der es dem Meere zueilt; dazwischen sind lange, steile, oftmals auf ihrem Rücken kaum füssbreite Gräten stehen geblieben, deren Wände an manchen Stellen lothrecht hundert Fuss und mehr abfallen. Sie stehen natürlich meist im rechten Winkel auf die Gebirgsaxe, und auf ihnen führen gewöhnlich die Pfade nach dem Hochlande von Tobah und Karo. Glücklich umspinnt und hält eine überreiche Vegetation diese lockeren Wände zusammen; eine in's Grosse getriebene Entwaldung dieser Gebiete muss nothwendig bei den grossen, häufigen

¹⁾ Wobei jedoch nicht geleugnet werden soll, dass das Meer ebenfalls seinen Beitrag zu diesem Alluvium liefert; denn die vom indischen Ocean hereinkommende Strömung fängt sich an der Granitküste Malakka's und wirst nun im Rückstrom ihren Schlamm ebenfalls an unsere Küste. Doch möchte ich sehr bezweiseln, ob der Granitand Deli's ganz oder selbst nur zum grössten Theile auf diese Weise von Malakka berübergeschwemmt ist.

Regen bedeutende Erd- und Bergsturze, und dadurch eine um so raschere Versandung und Verschlammung des Unterlaufs der Flüsse zur Folge haben.

Diese, die Flüsse, sind sehr zahlreich und haben ihre Quellen alle entweder an den Flanken des Gebirges oder auf der Hochebene selbst, oft ganz in der Nahe des Tobahsee's, wie z. B. der stattliche Lankatfluss der Wampo, dessen Quelle ich am Fusse des unmittelbar am See stehenden Berges Dolok-dändu-binoa fand 1). Von diesem Flusse an bis zum Asahanflusse zählt man nicht weniger als acht ziemlich beträchtliche Flüsse; der Delifluss z. B., bei weitem nicht der grösste, hat nahe seines Mündung eine Breite von 370 Metern.

Dass bei der geringen Bodensteigung, etwa 1:1000 Meter, die Wasser läuse sast horizontal verlausen und wenig Lust haben, mit einiger Schnebligkeit dem Schosse der See zuzueilen, ist begreislich; sie drücken und winden sich in allen möglichen Mäandern im Unterland herum, statten sich durch ein Netz von naturlichen Kanälen gegenseitig Besuche ab, st dass ein Fisch, der zum Delistusse hineinschwimmt, ganz gut zum Sen dangslusse wieder herauskommen kann, geben sich Rendez-vous und veran stalten Vergnügungspartien in Form von unzähligen Tümpeln, Weihern und Sümpsen (paija's) oft von sehr grosser Ausdehnung. Ein Glück nur, das die Ebene nicht breit genug, und daher der Druck, mit dem das Wasser von den Gebirgshängen herabbraust, noch genügend stark ist, um der Strom in mässiger Bewegung zu halten; sonst wäre es auch um das kleinste trockene Plätzchen geschehen.

Das Druckwasser dieser zahlreichen, trägen Flüsse und die häufigen starken Niederschläge finden in dem wenig geneigten Boden, der au einer starken, undurchlässigen, zähen Thonschicht, ruht, keinen Abflus und haben daher die überliegende Sand- und Humusschichte wie eines Schwamm durchtränkt; überall, wo nur eine kleine Vertiefung oder Einsenkung sich findet, steht das Grundwasser als paija, Sumpf, zu Tage An den meisten Stellen kann man kaum ein Loch von vier Fuss Tief graben, ohne dass es in kurzer Zeit voll Wasser läuft; in Labuan mus man die Särge der Verstorbenen förmlich ins Wasser versenken. Di dieses Grundwasser auch bedeutenden Schwankungen, je nach det Jahreszeit, unterworfen ist, so bildet es einen Hauptbrutheerd für die Malaria. Es ist hier der Ort, die Thatsache mitzutheilen, dass man ist

¹⁾ Cf. den Rapport über meine zweite Reise nach dem Tobahsee, l. c.

Labran mehrere artesische Brunnen mit gutem Erfolg gebohrt hat, einen sogar dicht am Strande, in Belawan. Zwischen 65 und 85 Meter Tiese stiess man bei den 4 Brunnen auf gutes, helles Wasser, das mit ziemlicher Krast hervorsprudelte (bei Belawan 300 Liter per Minute). Dasselbe hatte einen schwachen, im Ansang etwas stärkeren Schweselwasserstoffgerich, und sühlte sich ziemlich warm an, wärmer als Flusswasser; gemessen habe ich die Temperatur nicht.

Es enthielt ziemlich viel organische Bestandtheile, und wurde bei der Analyse in Batavia als zwar minder gutes, aber immerhin brauchbares Trinkwasser erkannt. Jedenfalls ist es für die Bevölkerung, die bislang am Cisternen (in diesem Boden!) und Flusswasser angewiesen war, eine unschätzbare Wohlthat.

Analyse v. Brunnen I.

Durch Humussubstanz gelblich gefärbtes, alkalisches Wasser.

Residuum per Liter 0,580 gr.
Verdampfungsverlust 0,080 ,,
Salze: 0,500 ,,

Bestandtheile:

Combination:

Chlor 0,035 gr. Kieselsaure Chlornatrium 0,113 ,, 0,058 gr. Kohlensäure 0,094 ,, Kiesels. Natron 0,230 ,, Natron 0,282 ,, Kohlens. Natr. 0,226 ,, 0,524 gr. 0,514 gr. Sauerstoffequivalent von Chlor 0,008 " 0,516 gr.

In einem mit Wasser so überreich ausgestatteten Lande ist natürlich auch die Verdunstung eine sehr bedeutende und demzufolge der Feuchtigkeitsgehalt der Luft ein sehr hoher. Alle nur einigermassen hygroscopischen Gegenstände müssen sorgfältig geschützt und gepflegt, d. h. so oft als möglich getrocknet und abgerieben werden; ich habe das zu meinem Schaden erfahren. Stiefel, die einige Tage stehen, überziehen sich mit Schimmel, Bücher gehen aus dem Leim, fournirte Möbel fallen aus einader; ein Gewehr, das nicht täglich gehörig geputzt und eingefettet wird, ist unwiderruflich dem Rost verfallen; von seineren Sachen, wie z. B. ärzlichen Instrumenten, gar nicht zu reden; mir standen beim Auspacken derselben nach einem mehrere Tage dauernden Umzug die Haare gen Berge! Die Zahlen sprechen für sich, darum gebe ich nachsolgend eine Uebersicht über den relativen Feuchtigkeitsgehalt der Luft im Mittel von

vier Jahren (1880—1883) 1), gemessen mit dem Klinkerfues'schen Haarhygrometer:

Relative	Feuchtigkeit	der	Luft in	Mittel	aus	1	Tahren:

MONA	T		Morgens %	Mittags %	Abends %	Tages- mittel	Amplitude
Januar. Februar März April Mai. Juni Juli August September October November Dezember			90,5 90 89,5 89,5 89,5 89,5 89,5 89,5 90,5	69,5 64 60 64 64,5 50 65,5 66 69 75,5	87 85 82 85,5 84,5 82 85,5 85,5 83 84 86,5	82,5 79,5 77 79,5 79,5 78,5 73,5 80,5 80,5 83,84,5	21 26 29,5 25,5 25,5 28 39 24 23,5 20,5 14,5
Jahresmittel:			89,5	65,5	84,5	80	

Die Lust in Deli enthalt also im Mittel stets 80 Prozent derjenigen Feuchtigkeitsmenge, welche sie nach dem jeweiligen Stand ihrer Temperatur überhaupt aufzunehmen vermag. Achtzig Procent beträgt auch — und das ist sehr bezeichnend — der Wassergehalt der Lust über der Meeressläche.

Deli scheint somit etwas feuchter zu sein, als die gegenüberliegende Seite der malaiischen Halbinsel, der rel. Feuchtigkeitsgehalt der Lust beträgt in Penang 76, in Provinz Wellesley 78, in Singapore 79, in Malacca 84°/o (Mittel des Jahres 1885; andere Jahre standen mir nicht zur Verfügung).

Des Morgens kommt sie ihrem Sättigungspunct am nächsten mit beinahe 90 Procent; die Luft ist also des Morgens am feuchtesten; mit der zunehmenden Wärme nimmt der relative Wassergehalt ab, und die Luft ist demnach des Mittags, wenn das Thermometer am höchsten steht, am trockensten, 65,5 %. Abends sinkt die Temperatur und steigt die Feuch-

¹⁾ Alle nachfolgend gegebenen Beobachtungen sind, wo nicht anders angegeben, von mir gemacht zu Tandjong-Morawa, Serdang, ± 20 Meter über der See. Die Beobachtungszeit war Morgens $6-6\frac{1}{1}h$, Mittags $12-12\frac{1}{1}h$, Abends $7-7\frac{1}{1}h$. Die Zahlen sind auf halbe Millimeter abgerundet.

tigicit wieder etwas, aber nicht so hoch wie am Morgen. Die mittleren täglichen Schwankungen betragen mithin 24°/o, sind also ebenso gross wie in Batavia, das die gleiche mittlere Amplitude von 24°/o hat, doch ist dort der allgemeine Feuchtigkeitsgehalt etwas höher als in Deli, nämlich 94°/o des Morgens und 70°/o des Mittags. Die Athmosphäre Batavia's enthielte somit noch um 4,5°/o mehr Wasserdämpse als Deli. Ich möchte jedoch bei diesem Vergleich zur Vorsicht rathen, da ein Haarhygrometer, wie es mir zu Gebote stand, zu den gröberen, weniger verlässlichen Instrumenten gehört.

Wie wir mit der zunehmenden Tagestemperatur die relative Feuchtigkeit abnehmen sehen, so sehen wir auch dementsprechend in den heissen Monaten dieselbe geringer als in den kalten resp. Regenmonaten. Der Juli hat die geringste, der Dezember die meiste relative Feuchtigkeit: der Unterschied, die Jahresamplitude beträgt 11°/o, gegen 9°/o in Batavia. Letzterer Ort scheint also doch wirklich etwas seuchter zu sein.

Die Differenzen der einzelnen Tage sind im Monat Juli am grössten und betragen oft 50°/o. Dass das Minimum des relativen Feuchtigkeitsgehaltes der Luft dem Temperaturmaximum um einen Monat nachhinkt und das Maximum derselben dem Temperaturminimum um einen Monat voraus ist, und nicht, wie es eigentlich sein sollte, mit ihnen zusammenfallt, beruht wahrscheinlich auf Beobachtungssehlern in der Temperatur, da es sich nur um einige Zehntelsgrade handelt.

Wir wollen nunmehr die athmosphärischen Niederschläge etwas näher in's Auge fassen.

Die Regenzeit beginnt in Deli im August und endet im Januar, doch fällt auch in der trockenen Zeit noch eine ansehnliche Menge Regen, wie aus den nachstehenden Tabellen hervorgehen dürfte. Ich verdanke dieselben der Gute des Administrateurs der grossen Tabaksbau-Gesellschaft "Deli-Maatschappij", Herrn van den Honert. Da namlich der einen Weltruf geniessende Tabaksbau in Deli ganz von den Regenverhaltnissen ablängt, so hat man sich von Seite der betheiligten Pflanzer gerade mit dieser Seite der Meteorologie ganz besonders abgegeben, und eine Menge "Regenwahrnehmungen" veranstaltet, von denen die der "Deli-Maatschappij" die umfassendsten und besten sind. Sie wurden angestellt zu Medan-Putrie 17 Km. von der See in 14 M. Meereshöhe.

Danach zählte man Regentage vom Jahre 1875 bis 1887:

MONAT	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	Mit
Januar	5	9	16	16	20	16	15	14	16	18	7	13	14	137
Februar	0	2	10	11	9	7	1	13	6	8	4	5	14	6
März	8	6	14	8	18	12	15	7	10	9	6	5	17	10
April	11	11	13	12	19	14	8	10	7	10	10	10	9	11
Mai	10	6	18	18	21	21	17	13	15	15	11	17	17	15
Juni	8	16	20	15	8	10		10	12	14	19	8	9	12
Jali	12	15	15	20	18	10	ıi	8	12	18	11	13	7	13
August	18	14	16	28	22	21	17	16	18	21	14	17	18	18
September	15	17	19	25	14	18	19	23	15	17	22	17	7	18
October	21	28	20	22	24	17	19	22	22	23	21	15	22	21
November	18	23	21	21	20	20	17	16	19	22	18	16	20	19
Dezember	10	21	19	18	15	17	17	22	15	20	19	22	20	18
Mittel:	181	168	201	204	203	183	161	172	167	185	162	158	194	1741

Für die trockene Zeit, Februar bis Juli, beträgt hienach die Anzahl Regentage 11, für die Regenzeit, August bis Jannar, 18 Tage, im jährlichen Durchschnitt 14,5 Tage im Monat; man kann also gut und gern auf zwei Tage einen Regentag rechnen. Wir wollen nun die Menge der gefallenen Niederschläge betrachten.

An den ebenerwähnten Tagen fiel Regen:

Jahresmenge: .	2340	2650	2060	2450	2130	2230	2290	1770	1850	2100	1830	1820	2356	212
Dezember	280	150	110	150	120	240	260	220	140	180	230	240	291	18
November	850	170	800	200	340	290	880	280	280	340				20
October	220	580	210	400	280	190	810	190	170	190	240	230	242	26
September	840	870	280	470	200	210	270	210	280	820	320	220	146	28
August	180	170	220	220	250	860	140	100	180	880	290	180	154	21
Juli	180			260						130	80	170	119	16
Juni	160	270	250	190	70				180	160	280	80	92	18
Mai	190						-							15
April	240											130	100000	12
März	140											30		
Februar	l ŏ	1						•			- : :	60		. 6
Januar	60	250	180	220	830	140	170	80	130	180	80	40	78	14
	mm.	mm.	mm.	mm.	mm.	mm	mm.	mm.	mm.	mm.	mm.	mm.	mm.	1211
MONAT:	F 1 1 1	72	100	110	The state of		1200	10712		5.00	7.5		1887	
	2000				1000	1000			2000	2001		1000	1000	****

Die monatliche Regenmenge von Februar bis Juli beträgt im Mittel 127 mm., die von August bis Januar 227 mm., also um 100 mm. mo-

natich mehr, im Jahresdurchschnitt also per Monat 177 mm. Wir konnen also wohl sagen, dass die Ostkuste Sumatra's ein regenreiches Land ist, wo der Gegensatz zwischen trockener und nasser Jahreszeit nicht so schroff ist, ganz entsprechend seiner Lage nahe am Gleicher und geschutzt vor den Mussonwinden. Trotzdem erreicht seine allgemeine jährliche Regenmenge kaum die Halfte der schauerlichen Regengusse, welche oft über die gesegneten Fluren Vorderindiens herabstürzen, und wo die mittlere Regenmenge im Jahr 4445 mm. (Mulmein), 5570 (Akyab), 6500 oder gar, wie in Cherra Punji 14200 mm. betragen? Was wollen dagegen unsere 2129 mm. Jahresdurchschnitt besagen?

Auf der andern Seite der Malakkastrasse, in Singapore, Penang, Malakka sind die Regenverhaltnisse fast die gleichen, wie folgende Tabelle von Singapore zeigt. Es fiel Regen in Singapore:

1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885
ин. 2386	2284	1490	2620	2950	2825	2642	2240	1780	2035	1710

Im Durchschnitt aus 11 Jahren also 2270 mm.

Auf der Westkuste Sumatra's herrschen augenscheinlich andere Verhaltnisse, denn in Padang z. B. betragt 1) die Regenmenge, im Durchschnitt aus sieben Jahren (1850—1856) gewonnen, das Doppelte, namlich 4797 mm.

Der Zeitpunct, wo die Sonne in Deli, das unter 3° 35" N. B. (Breite der Hauptstadt Medan) liegt, zum zweiten Mal im Zenith steht, nämlich der September, bezeichnet auch den eigentlichen Eintritt der Regenzeit; dieser Monat besitzt auch das Maximum der Niederschläge, die trockene Zeit setzt im Februar mit dem Regenminimum ein; Januar und August sind als Uebergangsmonate zu betrachten. Im Mai sehen wir eine kleine Zunahme der Niederschläge, eine Art kleiner Regenzeit, welche das einzige Zeichen für unser gegen den Musson geschutztes Land ist, dass dienssen der Südwestmusson, der Regenwind, einsetzt, d. h. dass die grossen, durch die nahende Sonne stärker erwärmten Landermassen Asiens im Norden die kältere Luft über dem indischen Ocean zu aspiriren beginnen.

Nach Friedmann, Dr. S.: "Niederländisch Ost- und West-indien etc. mit besoniert Darstellung der klimatischen und sanitätischen Verhältnisse". München, 1860, p. 101.

Bei uns, ich will sagen, auf der Ostkuste Sumatra's, herrschen, wie uns die Tabelle über die Windrichtung noch zeigen wird, fast ausschliesslich Land- und Seewinde. Der Seewind treibt die mit den Wasserdampfen des Meeres geschwängerte Lust gegen die dichtbewaldete hohe Gebirgsmauer, welche hinter der Küstenebene steht und sie mit ihrer ganzen Breite auffangt, und dort condensiren sich dieselben zu heftigen Gewittern und Regengussen. Schon mancher Tabakspflanzer wird zu seinem Schaden erfahren haben, dass in den Schluchten und an den Flanken des Gebirges Regengusse viel häufiger sind als in der Kustenebene. Dieser Reichthum an Wolken und Wasserdampsen an den Bergflanken infolge der lokalen Winde, und die dadurch verhinderte grössert Erwarmung der Pflanzendecke jenes Gebietes durch die Sonne, ist, wie Grisebach (Vegetation d. Erde S. 62 ff. II Bd.) ganz richtig vermuthet, die Ursache der von Junghuhn beobachteten Depression der Wolkengrenze auf Sumatra (s. Junghuhn, die Battaländer etc. Bd. I, p. 113 f.) welche den Eichen z. B. fast bis zum Fuss des Meeres herunterzugehen gestattet, während sie in Java erst bei 4500' häufig werden (Grisebach 1. c.), s. weiter unten. Jene Gegenden sind also das wahre Wasser-und Regenreservoir Deli's, welche dem Seewind seine Wasserdampse abnehmen und niederschlagen; auf die dahinterliegende Hochebene gelangt derselbe um vieles wasserärmer, wie ich selbst auf meinen beiden Reisen nach jenen Strecken constatiren konnte. Obwohl ich in der nassen Zeit und unter strömendem Regen die Ebene und das Vorland durchreiste - im Dezember! - hatte ich auf der Hochebene von Tobah nur einige wenigemale kurze Regenschauer zu verzeichnen. Nur im Kessel des Tobahsees hatte ich (im August) von 2 bis 5 Uhr Nachmittags regelmässige Regengusse, die ihr Entstehen wohl nur den Wasserdampsen des Tobahsees verdanken (cf. meinen Reisebericht in Petermanns geogr. Mittheilungen, 1883). Das Plateau hat ca 4000 Fuss Meereshöhe, der Seewind entledigt sich also in Folge der starken raschen Abkuhlung beim Aufsteigen, meist unter Gewittererscheinungen seiner Wasserdämpfe, grösstentheils in der Höhe zwischen ein tausend und dreitausend Fuss. Ich will nochmals hier darauf hinweisen, wie schadlich eine ganzliche Entwaldung dieser Strecken, zu der die Tabakspflanzer leider schon einen ganz bedeutenden Anfang gemacht haben, auf die Regenverhältnisse Deli's einwirken wurde. Abgesehen von den Erd- und Bergstürzen und der dadurch herbeigeführten rascheren Versandung der Flusse, welche ihrerseits wieder naturgemass haufigere und starkere Ueberschwemmungen des Unterlauses bedingen, hat man in Indien (im

Nerbudda- und Tachti-Gebiete) direct die Beobachtung gemacht, dass Waldreichthum und Regenmenge in directer Beziehung zu einander stehen. Und wer die traurigen Folgen einer ganzlichen Entwaldung der Gebirge sehen will, der rufe sich nur die Insel Cypern, einst die Kornkammer des Orients, ins Gedachtniss! Nun hat aber, wie sich jedermann durch einen Blick auf die vorstehenden Tabellen überzeugen kann, die Regenmenge in Deli seit dem Jahre 1882 nicht unerheblich abgenommen (das ungemein nasse Jahr 1887 bildet eine Ausnahme), und in den letzten Jahren sind Ueberschwemmungen in solcher Häufigkeit und solcher Ausdehnung eingetreten (sogenannte banjir's), wie sie in Deli noch nie erlebt wurden. Ich habe selbst einige solche mitgemacht. Das mögen die Pflanzer bedenken, und bei Zeiten dazu thun! Ein Glack nur, dass die übermächtige tropische Natur sofort wieder nothdürftig die durch den Menschen geschlagenen Blössen zu bedecken im Stande ist, und dass der Tabaksbauer sich gezwungen sieht, dem durch den Tabak erschöpften "abgebauten" Stück Land einige Zeit Ruhe zu gönnen.

Den Verhaltnissen entsprechend, sind die Regen mehr lokal, strichweise, besonders in der ersten Jahreshalfte; die Grenze eines solchen Schauers ist oft sehr scharf, wie abgeschnitten, und seine Richtung durch eine zufallig wehende Luftströmung bedingt; von zwei neben einanderliegenden Pflanzungen kann die eine einen ausgiebigen Regenguss erhalten, wahrend auf der andern die jungen Tabakspflanzen vor Trockenheit absterben. Die meisten der kurzen, heftigen und ausgiebigen Gusse dieser Periode sind Gewitter, d. h. sie gehen mit starken electrischen Entladungen gepaart.

Um den lokalen Character der Niederschläge zu zeigen, will ich in solgender Tabelle die Regenverhaltnisse für Tandjong-Morawa in Serdang, etwa 15 Km. südöstlich und in fast gleicher Höhe (20 M) und Entsernung von der See mit Medan, dem Beobachtungsort der Deli-Maatschappij geben.

Meine Beobachtungen umfassen die Jahre 1881-1883. Es fiel Regen:

MONAT	1881		1882		1883		Mittel der	
MONAT:	Tage	mm.	Tage	mm.	Tage	mm.	Tage	R. Menge
Januar Februar			12 13 11 10 11 7 7 16 19 15 17	102 109 60 88 75 100 100 146 195 245 291	15 3 5 9 18 12 12 14 14 20	93 36 52 92 236 200 180 169 138	14 8 8 10 14 10 10 14 16 18 18	98 73 56 90 156 150 140 137 192 230 262
Total:	-	_	154	1661	<u> </u>	_	156	1806

Man sieht, die Menge des dort gefallenen Regens ist geringer, als die in Medan beobachtete.

Hagelschlag ist in Deli keine seltene Erscheinung und kommt, wenn nicht alle Jahre, so doch alle paar Jahre einmal vor, und am häufigsten, wenn ich mich recht erinnere, in den Monaten Mai bis Juli. Die Provinz Lankat scheint in dieser Beziehung besonders heimgesucht zu sein, wenigstens habe ich von dort die meisten Fälle notirt; es scheint dies mit der orographischen Beschaffenheit des Landes in Verbindung zu stehen, denn dort befindet sich eine Spalte in der Gebirgsmauer, durch welche die kalten Winde vom Plateau ungehindert herabbrausen konnen. Auch die Stürme scheinen dort am liebsten zu hausen.

Thau schlägt sich, wie in einem solchen Land nicht anders zu erwarten, allnächtlich sehr reichlich nieder und dichte Nebel sind, besonders in der Regenzeit, ziemlich häufig. Auf der Hochebene von Tobah sind, infolge der rascheren und stärkeren nächtlichen Abkühlung, sowohl Thau als Nebel bedeutend intensiver als in der Küstenebene. Des Morgens trieft dort Alles von Nässe und erst gegen 10 Uhr hat die Sonne wieder Alles aufgetrocknet. Dabei ist die Luft jedoch ausserordentlich trocken, so dass ich selbst bei mehrstündigen, sehr anstrengenden Klettertouren kaum in Schweiss gerieth.

Zu erwähnen bleibt mir noch, dass die Lust, insolge der grossen gassörmig darin ausgelösten Feuchtigkeitsmenge, ausserordentlich klar

und durchsichtig ist, so dass man an guten Tagen an der doch 40—50 Kilometer Luftlinie entfernten Gebirgskette Details, wie Wiesen, Baumwipfel und Felsspalten erkennen kann. Ich habe mich auch anfangs auf der Jagd beim Schätzen von Distanzen regelmässig fast um die Hälfte geirrt.

Nachfolgend gebe ich nun die Tabelle der Temperatur der Lust im Mittel aus vier Jahren (1880—1883), von mir zu Tandjong-Morawa (Serdang) beobachtet:

MONAT:	Morgens 6—6½ h.	Mittags 12—12 1/2 h.	Abends 7-7\frac{1}{2} h.	Mittel:
Januar	22,8° C. 22,5 22,6 23,4 23,3 23,2 22,6 22,7 22,7 23,1 23,4 23,4	28,8° C. 3°,3 3°,8 31 3°,7 3°,9 31,2 29,7 29,6 29,1 28,3 28,4	26,8° C. 27,4 27,7 27,7 27,7 28,3 28 27,1 27 26,8 27	26,1° C. 26,7 27 27,4 27,2 27,5 27,3 26,5 26,4 26,3 26,2 26,3
Mittel:	23	30	27,4	26,7

Soweit man also diesen Beobachtungen, die mit gewöhnlichen Quecksilberthermometern angestellt wurden, deren Richtigkeit nicht an einer
Anstalt controlirt werden konnte, Glauben schenken darf, beträgt die
mittlere Jahrestemperatur 26,7° C. Deli wurde somit genau dieselbe mittlere Temperatur besitzen wie Singapore (26,9° C. nach der allgemeinen Erdkunde von Hann, Hochstetter und Pokorny, p. 78) 1). Der kälteste Monat ist der Januar mit 26,1°, der heisseste der Juni mit 27,5°. Die Temperaturdifferenz der einzelnen Jahreszeiten, die jährliche Amplitude,
beträgt sonach nur 1,4° C., und entspricht damit genau der für Orte
mier dem Aequator gefundenen Jahresschwankung. Die täglichen Tem-

¹⁾ Die in dem »Journal of the Straits branch of the royal asiatic society" gegebenen Teaperaturcurven ergeben jedoch für Singapore im Mittel aus 16 Jahren 27,4° C. Sech derselben Quelle scheinen Malacca, Penang und Provinz Wellesley eine noch lehre Mitteltemperatur zu besitzen.

peraturschwankungen betragen im Mittel 7° (23° Morgens, 30° Mittal Die grösste Differenz, fast 9°, findet im Juli, die geringste, 5°, im Deze ber statt. Die nasse oder Regenzeit zeigt die geringsten Temperat differenzen.

An der Tabelle lässt sich sehr gut das Ansteigen der Temperatur der trockenen Zeit, Februar bis Juli, erkennen; die Mittagstemperatu steigen sämmtlich über 30°.

Die Temperatur des Flusswassers beträgt 24° C. und ist being constant.

Ueber die Verhaltnisse des Luftdrucks wage ich kaum etwas mit theilen, da ich nur kurze Zeit mit einem uncontrolirten Aneroidba meter beobachtete. Sein Stand wechselte zwischen 755 und 761 mm den extremsten Fallen, für gewöhnlich betrug die tägliche Schwank!

1/2-2 mm., meist zwischen 756 und 759 mm.

Nachfolgendes war z. B. der Gang für die Monate Mai-August zu Tandjong-Morawa.

	MORG.	MITT.	ABEND
Mai	756	755 '	756
Juni	757	75 7	757,5
Juli	757,5	758	758
August	758	757,5	75 7 ·

Der mittlere Luftdruck in Singapore (Mittel aus d. J. 1870—188 beträgt ebenfalls zwischen 757 und 759,5 mm.

Die Winde auf der Küste Deli's sind ausschliesslich Land- und Swinde. Bis morgens gegen 10 Uhr (der Zeitpunct wird etwas durch Fluthperioden verändert) weht von dem kälteren Lande nach dem Mehin eine leichte Südwestbrise. Um die Mittagszeit aber, wenn die Sordas Land stärker erwarmt hat als das Meer, zieht, gewöhnlich zust menfallend mit der rückkehrenden Fluth, eine gute, kräftige Norde brise nach dem Lande zu, welche die Delischen Fischer gewöhnlich Heimkehr vom Fange benützen. Dieser Wind bläst noch um 8 Under Macht. Er für die Wasserdampfe, wie gesagt, nach den Bergwänden, und desshalb klären sich auch die ungemein häufigen abendlichen Regen und Gewitt

Ich gebe zum Beweise dessen nachstehend die Tabelle der von in Tandjong-Morawa von 1881 bis 1883 beobachteten Windrichtung also die Mittel von 3 Jahren.

MONAT:	Morgens.	orgens. Mittags.	
Januar	NW. (SW.)	NW.	N. u. NO. u. NW.
lebruar	SO. u. S. u. NW.	NO. u. N. u. NW. u. SO.	NO. u. N. a. S. a. NW.
Márs	NO. (80. u. 8W.)	NO. u. 80.	NO.
April	NO. u. NW. (80. u. 8W.)	NO. (NW)	NO.
Mai	SW. (NO.)	NW. u. NO.	NO.
Jani	SW (NW.)	NO. u. NW.	NO.
Jali	SW. (SO. u NO.)	NO. (NW.)	NO.
August	SO. u. SW.	NO. (N. u. NW.)	NO.
September	SW.	NO. (NW. u. N.)	NO.
October	SW. u. 80.	NO. (NW. n. SO.)	NO. (N.)
Nevember	SW. (NW.)	NW.(NO.)	NO.
Desember	SW. (NW.)	NW. (NO.)	NO. (N.)

NB. Die in Klammern stehenden Buchstaben bezeichnen die nachsthäufige Windrichtung.

Von einem Musson ist also, wie man sieht, Nichts zu spüren, wenigstens nicht in den unteren Luftlagen; man müsste denn die vorherrschenden NO Winde des Morgens von Januar bis Mai für Zeichen eines solchen halten. Dem widerspricht aber die Windrichtung der übrigen Tageszeiten — fast ausschliesslich NO. Auf der gegenüber liegenden Seite von Malakka jedoch, in Malakka und Singapore, von denen die Windbeobachtungen von 1885 vor mir liegen, scheint man wohl etwas vom Musson zu spüren. Dort is die herrschende Windrichtung vom November bis April NO., von Mai bis October SW. Im April und October herrschen Uebergangswinde, im ersteren O., im letztern W.

Auch in unserer Tabelle zeichnen sich April und October durch Veranderlichkeit der Windrichtung aus, ganz besonders hervorragend jedoch der Februar, der Beginn der trockenen, heissen Zeit und zugleich der trockenste Monat des Jahres.

Ueber die Stärke des Windes habe ich keine Beobachtungen gemacht, doch kann man sie als lokale Luftströmungen als schwach oder höchstens mittelstark bezeichnen.

Einzelne heftige Sturme und Wirbelwinde sind jedoch nicht selten, namentlich in dem mehr exponirten Lankatgebiete, wo die Pflanzer oft ihre leichten Tabaksscheunen gegen den Anprall des Windes mit starken Stutzen versehen müssen, und in der Zeitung von Deli, dem "Delicourant" kann man alljährlich lesen, wie einzelne Windstössse eine oder mehrere dieser leichten Bauwerke umgeweht haben, besonders in der Zeit

von August bis October, wenn dieselben schwer mit Tabak belastet sind.

Auf der Hochebene von Tobah sind schwere, starke Winde und Stürme, gewöhnlich nördliche, sehr häufig, und manchmal mit Schnee oder Hagel gepaart; die malaiisch redenden Batta's nannten die Erscheinung Atjan ajer batu passir, wörtlich: Eissandregen; welche der beiden Gefrierungsformen dies bedeuten soll, konnten sie mir nicht klar machen; dass die Temperatur des Wassers und der Luft zwischen 3 und 4 Uhr des Morgens im Dezember bei Nayasaribu nahe am Gefrierpunct stand, habe ich schon in meinem mehrerwähnten Reiserapport gesagt. Die grossen, hohen Idjukdächer der Kampongs auf dem kahlen Plateau hat man durch ein übergelegtes Netzwerk von langen Stangen vor der Kraft der Stürme zu schützen gesucht.

Ich beabsichtigte in Vorstehendem durchaus keine erschöpfende topographisch-meteorologische Monographie Deli's, — dazu fehlt mir das litterarische Material — sondern nur eine fluchtige Uebersicht der geographischen und klimatischen Beschaffenheit unseres Landes zu geben, soweit ich selbst diese wahrnehmen und beobachten konnte. Da meine Tabellen bisher noch nicht publicirt worden sind, so glaubte ich hier den geschickten Platz, sie bekannt zu geben; so kurz sie auch sind, so mögen sie doch vielleicht einigen wissenschaftlichen Werth haben.

DIE PFLANZENWELT.

Wir wollen nunmehr die Vegetation unseres Gebietes etwas naher betrachten, eine Vegetation, so wunderbar und uppig Alles überwuchernd, dass der berühmte Ausspruch Junghuhns: "Ein Affe könne Sumatra von Süd nach Nord durchwandern, ohne jemals den Boden berühren zu müssen", wirklich ganz wörtlich zu nehmen ist. Wie oft kann man in Reisewerken von der Armuth der Tropenvegetation an schönen Blumen lesen! Grün, grün und immer wieder grün in allen Schattirungen, heisst es, aber keine hervorstehenden Blüthen, keine Blumen! Wer dies geschrieben hat — und es sind sehr viele, sogar berühmte Reisende darunter — der hat eben entweder seine Augen nicht genug aufgemacht oder er kam mit überspannten Erwartungen, hervorgerufen durch den Besuch grosser Treibhäuser, wo Blume an Blume gereiht steht. Blumige Wiesen, wie in Europa, gibt es freilich nicht, aber Blumen genug, und wer weiss, wo sich schneller

ein Strauss verschiedenartiger Bluthen und Blumen pflucken liesse, in Europa oder hier, nota bene, unter gleichen Bedingungen. Gauz abgesehen von der Legion der Kräuter, Sträucher und Schlingpflanzen, deren Blothen oft in den herrlichsten Farben 1) prangen, will ich nur an einige Baume erinnern, die zur Zeit der Bluthe einen nahezu seenhasten Anblick gewähren. Wie eine feurige Lohe leuchtet aus dem dunkeln Grun der Dadaphaum und einige andere Papilionaceen hervor, in schneeigem Weiss prangen verschiedene Ternströmiaceen, mit grossen, goldgelben Blumen bekleidet sich der Simbur, der Sennah- und Djohorbaum und röthlichviolett steckt der Bungor seine Kerzen auf. Das sind nur einige wenige aus der Masse heraus gegriffen. Aber drei Ursachen sind es, welche diesen Reichthum an Blüthen minder hervortreten lassen und sogar, wie wir oben gesehen haben, Armuth an solchen vorspiegeln können. Einmal die übergrosse Tendenz zur Blattbildung, welche sich therall in eminentem Grade bemerklich macht und sehr oft die Blumen verdeckt und versteckt. Ferner die oft ungeheure Höhe der blühenden Brume. Mann kann durch den Hochwald wandern, ohne anders als an den abgefallenen Blumen zu merken, dass die grune Decke hoch über uns im Bluthenschmuck prangt. Drittens endlich ist die Bluthezeit nicht wie in Europa meist auf die kurze Frühlingszeit zusammengedrängt, sondern dehnt sich über das ganze Jahr aus. Jeder Baum blüht so zu sagen, wann er will; dies ist in wörtlichem Sinn zu nehmen, denn ich habe ofters an ein und demselbem Baum die Wahrnehmung gemacht, dass er hie und da einmal ein Jahr das Blühen aussetzte, oder in einem Jahr zweimal blühte. Solche Unregelmässigkeiten scheinen nicht selten zu sein. Im Jahr 1887 z. B. strikten, so zu sagen, meine und meines Nachbars Fruchtbäume (NB. verschiedene Sorten!) gänzlich; wir sahen nicht eine einzige Bluthe und erhielten nicht eine einzige Frucht.

In den Waldern, wo, wie gesagt, die Blumen dem Auge meist zu weit entrückt sind, hat die Natur auf eine artige Weise für Ersatz gesorgt. Die meisten jungen Zweigspitzen und Schösslinge prangen da in den allerverschiedensten Farben; lebhaft roth, blau, schwarz oder gelb, was einen wunderschönen Effect hervorbringt und dem Auge einen ganzen Blumenflor vorzaubert; wie oft habe ich bedauert, dass sich diese zarten

¹⁾ Auch mir ist an den Blumenfarben in Deli die grosse Seltenheit des reinen Blau aufgefallen, welche Mohnike ("Blicke auf das Pflanzen- und Thierleben in den Niederl. Mahnienländern" Münster, 1883, p. 322) hervorgehoben hat. Von rein blauen Blumen sied mir in Deli nur zwei kleine Commelina-Arten bekannt,

Farben nicht conserviren liessen! Um in der Ueberfulle der sich uns darbietenden Pflanzenformen auch nur einigermassen Orientirung zu gewinnen, müssen wir suchen, die Vegetation in gewisse Zonen und Regionen einzutheilen. Diese sind leicht gefunden, sie bieten sich dem aufmerksamen Auge von selbst dar. Wenn wir von dem Meere her nach den Bergen zu schreiten, so betreten wir zunächst die Region der Strandoder Kustenvegetation, welche, hier schmäler, dort breiter, das Land vom Meere abschliesst. Auf diese folgt die Zone des heissen Tieflandes, welche den bei weitem grössten Theil Deli's umfasst, und von der vorigen scharf, selbst dem Laien auffallend, geschieden ist. Sie steigt an dem Gebirge etwa 1000 Fuss empor und geht allmählich, fast unmerklich, so dass keine scharfe Grenze zu ziehen ist, in die dritte, halbkühle oder Bergregion über, welche ihrerseits wieder scharf von der vierten, kühlen oder Hochlandregion getrennt ist, wie sie sich uns auf dem Plateau von Tobah in 4000' Meereshöhe präsentirt.

Vergleichen wir diese Eintheilung mit der klassischen Gliederung der Vegetation Java's durch Junghuhn, so springt uns wiederum die Thatsache in die Augen, von der wir oben schon gesprochen haben, nämlich dass die Vegetationsgrenzen in Sumatra im allgemeinen niedriger sind, als in Java. Die Ursache für Deli speciell ist in den oben beschriebenen lokalen meteorologischen Verhaltnissen zu suchen. Wir können hier nur nochmals die Richtigkeit dessen constatiren, was Grisebach (Die Vegetation der Erde, II, p. 63) sagt: "Es ist demnach eine allgemeine Thatsache, dass gleiche Pflanzenformen und wahrscheinlich zum Theil auch dieselben Arten auf Sumatra in einem viel tieferen Niveau vorkommen, als in Java, und dass dies gerade diejenigen Gewächse sind, auf denen der Typus der Regionen beruht". So steigen die Eichen, welche in Java erst bei 4500' häufig werden, in West-Sumatra bis zu 500', und in Deli bis zu 100' herab, die Rhododendren bis zu 3000' und die Baumfarne bis zu 600' und noch weniger 1).

Wir wollen nunmehr Wanderungen durch die einzelnen Regionen vornehmen, wobei ich jedoch eine kurze Vorbemerkung nicht unterdrücken
kann. Die Flora Deli's und der angrenzenden Landstriche ist bis jetzt
noch terra incognita. Noch kein Botaniker von Fach hat die jungfraulichen Urwalder durchforscht 2), noch kein Herbarium ist von da nach

¹⁾ Die Battaländer auf Sumatra, I, p. 118 f.

²⁾ Miquel's Flora Sumatrana führt nur wenig von dem uns berührenden Theil der Ostküste an.

einer wissenschaftlichen Anstalt gesandt worden. Ich war beim Studium der Pflanzenwelt ganz ohne Literatur oder sonstige Hilfsmittel. Grössere Sammlungen anzulegen, die ich an wissenschaftliche Institute hätte schicken können, war ich nicht in der Lage und somit vollständig auf mich selbst angewiesen. Ueberdies bin ich kein Botaniker von Fach und wohl wissend, dass viele der hiesigen Pflanzen neu sein würden, habe ich mich gehütet, zweiselhafte Speciesbestimmungen zu machen, sondern mich lieber auf den Familien- oder Genusnamen, sehr häufig auch allein auf den inländischen Namen beschränkt. Es soll ja das Nachfolgende keine systematische Pflanzenliste, sondern eine Reihe von Vegetationsbildern sein, wie sie eben ein Laie in der Botanik zu bieten vermag!

Die Kusten- und Strandvegetation:

Nahert man sich zu Schiff der Kuste von Deli, so erblickt das Auge maachst nur den festgeschlossenen, saftiggrunen Gurtel der Rizophoren oder Mangrove-Walder, die hier in der Breite von nahezu einer halben geographischen Meile das Land vom Meere abschliessen. Das Aussehen und die Lebensweise der Rhizophoren sind schon so oft und vielfaltig beschrieben worden, dass wir dies als übergenug bekannt füglich hier abergehen durfen. Man hat die Frage aufgeworfen, ob dieselben im Stande sind, Sand zu bilden, d. h. den in den Flussen suspendirten Sand und Schlamm mit ihrem siebförmigen Luftwurzelnetz so aufzufangen und abzulagern, dass er schliesslich zur über das Wasserniveau sich erhebenden Schlammbank und später zu festem Lande wird. Dies ist nur theilweise wahr. Erstlich findet sich der Mangrove-Baum nur da, wo wirklich schon eine mindestens zur Ebbezeit freiliegende Schlammbank besteht und zweitens kann man gerade an der Mundung des Deliflusses ausgedehnte, nackte, kilometerbreite Schlammbanke schen, die, einzig und allein durch Alluvium entstanden, schon so verdichtet sind, dass sie fast einen Menschen tragen, und über welche der Rhizophorengurtel nur sehr langsam und allmahlich nach dem Meere m vorrückt. Das primäre Landbildende ist, wenigstens für Deli, immer das Meer, bezw. der Fluss; das aber ist entschieden richtig, dass, wo die Rhizophoren einmal sich angewachsen haben, die Verdichtung des Schlammes zu festem Land und die Niveau-erhöhung desselben sehr rasch vor sich gehen, und zwar weniger durch auffangen der mit dem Flusswasser herabschwimmenden festen Bestandtheile als durch die Zerfallproducte der absterbenden Baume selbst. So ruckt der Waldgurtel und mit im das Land auf den vom Meere selbst vorgeschriebenen Pfaden, den Schlammbanken. langsam vor, ohne dass erstere jedoch b siter wurde;

denn so viele Individuen auf der Seeseite des Gurtels neu entstehen, eben so viele sterben wegen eintretendem Mangel an Salzwasser auf der Landseite ab, und ihre todten Wurzelstrünke zeigen noch auf Jahrzehnte hinaus die frühere Meeresgrenze. Bei Laboean z. B. kann man dieselben fast eine halbe Stunde weit über die jetzige Rhizophorengrenze hinaus verfolgen, und ein kühner Pflanzer hat sogar zwischen den todten Wurzelstrünken Tabak gepflanzt, ein Beweis, dass das Land daselbst schon allen Salzgehalt verloren hat. Bei dem Gefängniss in Laboean, ebenfalls eine gute Strecke oberhalb dieser Grenze gelegen, hat man gelegentlich Anlegung eines artesischen Brunnens in 70 Meter Tiefe noch wohlerhaltene Stämme von Kaju niri gefunden, wie ich oben schon erzählte.

Das Kaju bakau, wie die Malaien die Rhizophoren nennen, ist ein nutzliches Gewächs, das mancherlei Verwendung findet. Das Holz ist sehr hart und widerstandsfähig und besitzt einen sehr festen Kern, wesshalb es als Bauholz sehr gesucht ist, namentlich von den fürchterlichen Balkenzerstörern, den grossen Holzbienen (Xylocopa-Arten) wird es kaum angegriffen. Auch ist es ein sehr gutes Brennholz; mann kann am Anlegeplatz der Dampsschiffe bei Laboean, welche aus Mangel oder wegen zu grosser Theuerung der Kohlen fast nur Holz brennen, stets hunderte von Klaftern gespaltenen Holzes aufgestapelt sehen; die Chinesen haben sich dieses nicht unbeträchtlichen Industriezweiges, welche hunderten von Leuten Brod verschafft, bemächtigt; die Rinde enthält einen schwärzlichen Farbstoff, der allerdings nicht sehr gut ist, und meist nur von Aermeren zum Färben ihres Baumwollenzeuges gebraucht wird. Miquel (Flora v. Nederl. Indië, I, p. 582) spricht von dem ansehnlichen Gehalt an Gerbstoffen, der in allen Theilen dieser Gewächse enthalten ist. Die malaiischen Fischer benutzen auch gelegentlich den ausgepressten Saft der Rinde, um ihre Netze widerstandsfähiger gegen den Einfluss des Wassers zu machen, indem sie dieselben mit diesem Safte tranken. Endlich liefern die jungen, geraden, fingerdicken Schösslinge des Baumes noch das Material für einen Industriezweig, dessen sich ausschliesslich die Malaien bemächtigt haben. Sie werden in der Länge von 8 Fuss abgeschnitten, ihrer Seitenzweige beraubt und als anak Kaju an die Pflanzer verkauft, welche sie zum Aufhangen der geschnittenen Tabaksstauden in den Trockenscheunen gebrauchen. Der Handel damit ist gar nicht unbeträchtlich, denn in Deli werden jährlich Millionen solcher Stecken verbraucht.

Während in dem der See zunächst gelegenen Theil der Rhizophorensumpfe kaum ein fremder Bestandtheil das schone, aber einförmige und

desshalb langweilige Grun der Manglebaume unterbricht, mischen sich etwas höher hinauf an Stellen, wo der Schlamm auch bei Fluth nicht ganz von Wasser bedeckt ist, langsam einige andere maritime Baumfornen ein, die gewöhnlich viel höher sind als die niedrigen Rhizophoren and auch durch die Farbe und Gestalt ihrer Belaubung einige Abwechslung in die Landschaft bringen. Ich erwähne hier namentlich des Xylocarpus obovatus, des Kaju niri, eines ebenfalls sehr guten Bauholzes, mit kugelrunden, apfelgrossen Früchten, deren Genuss Betäubung und in grösserer Menge sogar den Tod herbeiftihren soll. Ein anderer bemerkenswerther Baum ist das Kaju api-api, (eine Avicennia-Art?) welches ein gutes Brennholz liesert; daher angeblich der Name: Kaju api-api = Fenerholz; nach Berichten von vertrauenswurdigen Malaien aus Deli hat es jedoch seine Benennung von einer Phosphorescenzfähigkeit seiner Rinde und Blatter, man soll das besonders in dunklen Nachten vielfach beobachten können; ich selbst habe mich zu diesem Zweck des Nachts nie in die fieberschwangeren Mangrove-Sumpse gewagt. Die Rinde eines anderen Baumes des Kaju tengar, besitzt einen schwachen, röthlichen Farbstoff, den die Malaien benützen, um ihre Fischgerichte zu farben; mit den Fischen wird ein Stuckchen der Rinde des Kaju tengar gekocht, wodurch das Gericht eine schmutzigröthliche Farbe erhält (mal. biendang ikan). Endlich haben wir aus dieser Region noch einen schönen Feigenbaum mit vielen Luftwurzeln zu erwähnen, von den Malaien Djawider sich besonders an den verschlungenen Seitenarmen im Delta des Deliflusses findet und einigermassen dem Waringin gleicht. Ebendaselbst wächst das Kaju buta-buta (Blindholz), Cerbera (C. Odollam? Gaertn.), so genannt, weil der Sast des Baumes, wenn ins Auge gekommen, gesshrliche Entzundungen hervorrust und gewöhnlich zur Erblindung führen soll. Desshalb weigern sich alle Arbeiter diese Bäume zu fällen, da sie den umherspritzenden Sast fürchten; östers geschieht dies nun, theils aus Unkenntnis der gefährlichen Eigenschaften, namentlich bei fremden Arbeitern, oder aus Verwechslung mit andern ahnlich aussehenden Baumen. Alle nackten Hautstellen, welche mit dem Saste in Beruhrung gekommen sind, gewöhnlich das Gesicht, die Hände und der nackte Oberleib, beginnen sosort die Symptome der hestigsten Entzundung zu zigen, sie schwellen unter Fiebererscheinungen an, das Gesicht oft so stark, dass es einen fürchterlichen Anblick gewährt und die Augen des Patienten ganz verschwinden, röthen sich, brennen stark und bilden Blasen, welche ihr gelbliches leicht getrübtes Wasser nach 3-4 Tagen entleeren und nun über die ganze Fläche helle Borken bilden, die nach einigen weiteren Tagen ohne Narbenbildung abfallen; damit ist der ganze Process abgelaufen, ohne eine tiefergreisende Störung verursacht zu haben, wenigstens in den wenigen Fällen, die mir zur Beobachtung kamen. Dieser böse Saft hat die Farbe und Consistenz der Milch und ist in sehr reichliger Menge in der Rinde enthalten, so dass man durch Einschnitte in kurzer Zeit mehrere hundert Gramm sammeln kann. Beim Eintrocknen nimmt derselbe eine schmutzigbräunliche Farbe an und verbreitet einen starken Fäulnissgeruch. (cf. die Bemerkung Miquel's über die giftigen Eigenschaften des Cerbera-Saftes).

Ein characteristisches Gewächs dieser Region bildet auch die bekannte Nipa-oder Atappalme, Nipa fruticans, welche aber wild nur vereinzelt vorkommt, z. B. im Deli-Delta, dagegen in Serdang und andern Orten der Ostkuste in grossen Mengen von den malaiischen Fursten und Beguterten angepflanzt und gezogen wird. Denn diese "Nipagarten" werfen einen ziemlich bedeutenden Gewinn ab. Die Blatter werden, getrocknet, über einen ca 3 Fuss langen fingerdicken Niebungstock zusammengefaltet und mit einer Rottannaht aufgereiht, als die bekannten Ataps in den Handel gebracht. Sie bilden fast das ausschliessliche Material zur Dachbedeckung und Wandbekleidung der Häuser für Malaien und Europäer; man kann sich daher denken, welche Mengen davon in Deli, insbesondere auf den Tabakspflanzungen zur Herstellung der vielen grossen Scheunen verbraucht werden, so dass die ganze Ostkuste Sumatra's nicht im Stande ist, den Bedarf zu decken und viele, viele Schiffsladungen jahrlich noch von Penang und selbst von Banjermassing angeführt werden mussen. Ohne diese nutzliche Pflanze wäre der Tabaksbau in Deli unmöglich, da man ohne dieselbe nicht in Stande ware, die umfangreichen Scheunenbauten, welche der Tabaksbau erheischt, schnell und billig genug auszuführen.

Man darf sich aber von einem solchen "Palmengarten" keine besonders schöne Vorstellung machen. Die Nipa ist ein Schmutzfink, welche sich nur da wohl fühlt, wo der Salzsumpf am dicksten ist. In dem schauderhaften Schlamm, halb Wasser, halb Erde, der keines Menschen Fuss trägt und ekelhafte Modergerichte in die Luste sendet, da kriecht ihr Stamm horizontal dahin, als könne er sich gar nicht von dem lieblichen Nährboden trennen, und lässt nur seine Blattkrone eben über den Sumpfspiegel sich erheben.

Zu der Brackwasservegetation gehören auch einige characteristische Sträucher, welche besonders an den Flussrändern und Sümpfen bis an die Flutgrenze vegetiren. Darunter ist besonders hervorragend der bläulich-

binhende Acanthus ilicifolius, welcher in dichtem stachligem Gewirr die genannten Gegenden besiedelt und ein Spiraea-Ahnlicher Strauch mit schonen weissen Blüthenballen.

Riesige Farne, Acrostichum-Arten, vervollständigen das Bild. Oberhalb dieser Fluthgrenze, zum Theil noch im Brackwasser, zum grössten Theil aber auf süssem Sumpfland, wächst als hochragende Marke des Ueberganges in das Süsswassergebiet der Baum Bira-bira, der ungefähr so aussieht, als wenn an seinen, übrigens völlig unbelaubten, Zweig-Enden riesige Kohlköpfe befestigt wären. Er kann eine Höhe von 50—60 Fuss erreichen und fällt durch seine originelle Form sofort auf. Die allbekannte Kokospalme, der es ganz gleich ist, ob sie auf salzigem oder süssem Boden wächst, will ich nur vorübergehend erwähnen, dagegen bleiben noch einige Worte über die Vegetation zu sagen, welche sich mmittelbar am Seestrande auf erhöhten Stellen und Dünen, wo die Rhizophoren nicht gedeihen, entwickelt. Solche erhöhte Strandstellen, Dünen, die meist nur wenige Meter breit sind und einige Fuss über das Meeresniveau emporragen, finden sich namentlich bei Serdang und weiter östlich läugs der Küste.

Erst hinter dieser Bodenwelle beginnen dann die Mangrovesumpse und die Stranddune stellt sich somit als ein ganz isolirtes Gebiet, eine Vegetationsinsel, dar. Der characteristische Baum dieser Strecken ist das Kaju zw, der Streitkolbenbaum (Casuarina litoralis), welcher durch sein eigentstalliches Aussehen die Blicke auf sich zieht. Gruppen dieser Baume sinden sich (spärlich) bei Serdang, deren eine die Erkennungsmarke dieser Landschast für die Seeleute bildet, und bei Baubaungan, wo sie sogar, da die Bäume im ziemlicher Entsernung aus einander stehen, einen netten parkähnlichen Wald bilden. Erhöht wird der Reiz noch dadurch, dass der ganze Boden mit einer schönen gleichmässig grünen, kuzen Rasendecke überzogen ist. Merkwurdig ist in unserer Strecke das Fehlen aller grösserer Pandaneen; erst an den Usern des Siakslusses kommen solche zu Gesicht.

Als Strandpflanzen finden sich ferner eine Reihe eigenthumlicher Graser, die zusammen mit einer rosenroth bluhenden Ipomæa (litoralis?) als üchter Filz den Sand überziehen. Dazwischen wachsen auch Baume und Stäncher aus den höher gelegenen Gegenden, deren Samen vielleicht durch Absicht oder Zufall hierher gelangten, so z. B. eine merkwürdige Kannenpflanze (Nepenthes), die ich weiter unten näher besprechen werde und die bekannte Abrus precatorius, deren kleine kugelrunde, prächtig wich und schwarz gefärbte Bohnen einen beliebten Schmuck bilden. Aus-

serdem habe ich noch (bei Labuan) jedoch nur in zwei Exemplaren eine schöne silberglänzende Palme, *Phoenix* (*Haukana?*) entdeckt, die jedoch, wie es scheint, auch auf nicht salzhaltigem Boden gedeiht, denz ich habe sie in dem botanischen Garten zu Singapore angepflanzt gesehen.

Damit hatten wir den Ueberblick über die Salz- und Brackwasser region beendet und wenden uns zu dem Terrain, welches unmittelbas an das vorige anstösst. Wir haben es hier auch noch mit der nur wenig (von 3 bis höchstens zu 20 Metern) über dem Meeresspiegel erhabenen, etwa 2 geographische Meilen breiten Alluvialebene zu thun, welche von den zahlreichen, netzartig unter einander verbundenen Flussen in stark mäandrischem Laufe durchströmmt wird, die zahlreiche und ausgedehnte Sumpse bilden, welche in der heissen Zeit zum Theil trocken liegen. Man könnte diese Region mit Fug und Recht die Sumpfregion heissen. Diese Gegenden, namentlich längs der Flussläufe, sind es, welche die Malaien vorzugsweise bevolkert haben, hier fühlen sie sich am wohlsten. Auch die grossartige Entwaldung behufs Anlegung der europäischen Tabakspflanzungen begann hier, so dass der Urwald, der früher sowohl die Berg- als diese Sumpfregion gleichmassig bis zur Salzwassergrenze aberzog, hier schon seit anderthalb Jahrzehnten völlig verschwunden ist. Man sieht nur noch angebautes Land (Obstgärten und Paddifelder) und unzugängliche Sümpse, an einigermassen trockenen Stellen auch ausgedehnte Savanen, Lalangwüsten. Wir wollen zunächst einen Blick auf das dem Fusse meist unzugängliche, uppige Gewirr der Sumpfpflanzen werfen.

Da ragen zunächst über die niedrigen Formen einige Fächerpalmen hervor, so besonders eine Corypha (C. Gebanga?) sowie die schöne hohe und schlanke Serdangpalme 1) (eine Livistona-Art, L. olivaeformis?), welche dem östlich an Deli grenzenden Sultanat Serdang den Namen gegeben hat. Die Serdangpalme kommt übrigens auch in höher gelegenen Strecken vor. Die Tabakspflanzer halten das Land, auf dem viele Serdangpalmen stehen, für die Tabaksstaude nicht besonders gedeihlich. Sehr zierlich und niedlich nehmen sich die gruppenweise meist mitten im Wasser wachsenden Licuala-Sorten, Palas mal. aus, besonders L. longipes. Der Wasserspiegel ist bis zur Unsichtbarkeit bedeckt von den breiten, fleischigen Blättern von Monochoria (Alisma), Sagittaria und Nymphaea-Arten, Ottelia alismoides Rich. nicht zu vergessen, mit schönen, weissen, röthlichen und blauen Blumen, sowie dem merkwürdigen Keambang ge-

Mohnike, Blicke auf das Pflanzeu- und Thierleben in der Niederländ-Malaiienländern, p. 68, schreibt: "Sadangpalme".

nannten Pflanzschen, Pistia stratiotes L. (Aroideae), welches mit einer schönen, regelmässigen Blattrosette frei auf dem Wasser schwimmt, ohne mit seinen Wurzeln an den Boden geheftet zu sein und oft grosse Wanderungen von einem Wasserlauf zum andern unternimmt. Seine Zierlichkeit, Kleinheit sowie seine Eigenthumlichkeit machen es zu einem beliebten Gegenstand für die Aquarien. An den Rändern des Sumpses denke man sich ein undurchdringliches Gewirr von über mannshohen Schilfgräsern, colossalen malerischen Cyperaceen, riesenhaften Farrenkräutern und kleinen Pandanus-Arten, umwuchert und durchdrungen von tausenden namenloser Blumen- und Blätterranken, den weissen und rothen Blüthensträussen verschiedener Canna-Arten und Zingiberaceen, während sich die malerischen Festons unzähliger Rottanlianen von Krone zu Krone schlingen und die oft bizarren Formen grosser Aroideenblätter unsere Augen auf sich ziehen; so wird man ungefahr eine schwache Vorstellung von dem Alles überdeckenden Reichthum dieser Region bekommen können. Eme Pflanze möchte ich noch besonders hervorheben, das ist nämlich on merkwurdiger Nepenthes, welchen ich sowohl mitten im Sumpfwasser, als auch auf den salzhaltigen Dünen am Meeresstrande angetroffen habe. Die Pflanze gleicht mit ihren grunen, rankenden Stengeln und ihren langen, schmalen, grasartigen Blättern so sehr einem der vielen Schilf- oder Riedgräser, dass ich sie lange für ein solches hielt, obwohl mir der spannenlange halb aufgerollte fadenförmige Fortsatz an der Spitze des Blattes stets auffiel. Ich konnte indess nie die Bluthen oder die Kannen auffinden. Einem Bekannten von mir ist dies, nach dessen mundlicher Mittheilung, jedoch gelungen.

Die Graben und Abzugskanale sind gewöhnlich erfullt von den Blattern eines schönen saftgrünen wie der bekannte Sauerklee (Oxalis) aussehenden Famkrautes, einer Marsilia-species, einer rosafarbenen Winde, Ipomaea replans, mal. Kangkung, deren Blatter die Malaien als Gemuse essen, und von einer höchst merkwürdigen, schwimmenden Mimose, Sikerbut von den Malaien genannt, Neptunia oleracea Leur. Diese interessante Pflanze wurzelt in den Seitenrändern der Graben, da wo das Wasser kein starkes Gefalle hat, und sendet von hier aus lange blätter- und blüthentragende Ranken auf den Wasserspiegel hinaus, den dieselben ganz überziehen und sich vermittelst einer ganz eigenthümlichen, mir völlig neuen Vorrichtung schwimmend erhalten. Der Stengel ist nämlich von einem durch Wucherung des unter der Epidermis liegenden Zellgewebes entstandenen, schwammartigen Gebilde eingehüllt, welches in regelmässigen Intervallen, da wo die Zweige und Blätter hervorspriessen,

eingeschnurt ist, so dass es aussieht, als schwimme die ganze Ranke auf angebundenen Korken.

Die Fiederblätter sind dieselben wie bei der *Mimosa pudica*, vielleich um eine Kleinigkeit grösser, und besitzen ebenso wie diese die Eigenschaft sich auf die leiseste Berührung dicht zusammenzufalten.

Die Flussufer sind meist auf stundenweite strecken hin eingerahmt von einem undurchdringlichen, gegen to Fuss hohen Gewirr einer Saccharum Art (S. spontaneum?) von den Malaien Tjupran genannt, welches sich oft weit ins Land hinein erstreckt und jede Annäherung an das Wasse hindert. Man fährt wie zwischen Mauern auf dem Flusse dahin, ohne den geringsten Ausblick auf das User. An andern Stellen wieder hänger weidenartige Bäume (Salix sumatrana Miq. malaisch: Dedālu) sowie hohe krautartige Sträucher mit schön grünen, grossen, ovalen Blättern über den Fluss herein. Aber wehe dem, der sie anrührt! Es ist eine furcht bare Brennnessel, ins Riesenhaste vergrössert, gegen welche der Stich unserer europäischen Nessel gar Nichts bedeutet.

Das ist das beruchtigte Daun Djelatang der Malaien (Urtica stimulans?) Wie mancher hat schon seine botanische Unkenntniss durch tagelange furchtbare Schmerzen bussen müssen, da er nach Verrichtung einer Nothdurft im Freien die schönen grossen, zu dem Zweck wie geschaffen erscheinenden Blätter in bekannter Weise zu verwenden gedachte! Wie furchtbar die Schmerzen bei der Berührung sind, ja wie eine längere Geisselung mit den Blättern den Tod herbeizuführen im Stande ist, hat der holländische Schriftsteller Perelaer sehr drastisch in seinem Roman "Babu Dalima" geschildert.

Auch dichtineinandergewirrte Rottan-Dickichte besäumen oft weithin die Ufer, und strecken ihre dünnen, fast unsichtbaren, aber mit furchtbaren Stachelkränzen versehenen Ruthen weit hin über das Wasser, dem harmlos im Kahne Dahinfahrenden sanft, aber unwiderstehlich mit elastischem Schwung die Kopfbedeckung ablüpfend oder ihm beträchtliche Stücke aus Haut und Kleidern reissend. Man darf eben in den Tropen nur sehr selten einem träumerischen Naturgenuss sich hingeben, selbst wenn die Scenerie noch so sehr dazu einladet, sondern muss stets mit offenen Augen und Ohren auf der Lauer liegen gegen tausenderlei Fährlichkeiten. Derart sehen die Flüsse im Unterlaufe aus, soweit der Mensch mit seiner Cultur sich nicht da angesiedelt hat. Schöne Abwechslung bringen hie und da riesige malerische Farrenkrautwedel, die oft für sich allein ganze Dickichte bilden, sowie blühende Bäume und Blumen, so namentlich eine prächtige Akazie mit rosenrothen dichten Blüthentrauben

(Cassia Roxburghii?) oder ein weissbluhender Djambu ajer-Baum, Jambus aquea, während an lichteren Stellen im Grase eine Balsaminencolonie ihre purpurrothen Blüthen wiegt, oder grossblätterige Aroideeen und resige Crinum-Arten mit weissen oder rosenfarbenen Blumensträussen die schättigeren, niedrigeren Stellen bevölkern. Nur wenn der Fluss den Urwald durchschneidet, was aber im Unterlauf jetzt kaum mehr der Fall sein durfte, da heute auch die letzten Stämme von der alles vernichtenden Axt dahirngeschwunden sind, wird die Fahrt interessanter, ja grossartig, indem die bequeme Art des Reisens den vollständigen ungetrübten Genuss der erhabenen Pracht des Urwaldes gestattet.

Wir wollen uns nunmehr aus der Wasser- und Sumpfregion heraus auf die etwas trockeneren Stellen begeben, welche der Mensch schon seit langem gerodet und zum Anpflanzen seiner Nahrungsbedurfnisse verwendet hat. Die Erntezeit ist gerade vorüber und auf den verlassenen Feldern entwickelt sich eine Brachfeldvegetation, die wir überall auf allen Wegen und Stegen wieder antreffen. Schon wenige Tagen nach dem Abernten beginnt dieselbe. Die charakteristischste Pflanze ist eine kleine kriechende Portulacee mit kleinen gelben Bluthen. Daun rembilang von den Malaien genannt, welche sofort alle nackten Erdschollen überzieht. Dazwischen wuchern eine ebenfalls gelbbluthige Oxalis (O. cernua) und mehrere grasartige, kriechende Commelinaceen u. A. Comm. obliqua Don, an etwas sumpfigen, schattigen Stellen, und C. Hasskarlii Clarke? ktztere mit wunderschönen blauen Blümchen, welche an unsere Vergissmeinnicht erinnern. Der eben erwähnte Portulak wird von den Eingeborenen als Gemuse gegessen und die zerquetschten Blätter als kuhlende Umschlage auf entzundete Augen gelegt. Dass eine ganze Legion von Cyperaceen und Gramineen in jeder Grösse ihre grunen Leiber hergeben, um die nackte Blösse der Mutter Erde bedecken zu helfen, branche ich als selbstverständlich wohl nur zu erwähnen. Auch eine kleine Aroidee siedelt sich massenhaft hier an. Sie hat nicht ganz die Grösse des europ. Arum maculatum, wächst niedrig mit grünen pseilsormigen Blattern, hat aber eine wunderschöne, grosse, tief braunviolette sammtartige Blumendute ohne Stengel, welche jedem Blumentische zur Zier gereichen wurde. Das sind so die ersten Pflanzen mit denen die Erde ihr durch den Menschen abgerissenes Kleid zu flicken sucht. Bald bemerkt man auch einige Compositen, Vernonia chinensis Less. und Spilanthes Acmella L., ein stachliges Kraut, Amaranthus spinosa, spriesst hervor, welches ein ausgezeichnetes spinatahnliches Gemuse, Sayur bayam mal. liefert; es gesellen sich ferner Cyathula prostrata Bl., Desmodium gangeticum DC. und einige weisse und violette Solaneen und Polygonum-Arten, sowie die kleinen Sträucher des Sauropus sumatramus dazu, und eines der gemeinsten Unkräuter in Deli, ein holziger rosabluthiger Malvaceenstrauch (Urena Lappago?) hilft schliesslich mit. dass nach Monatsfrist des Menschen Fufs ohne Beihilfe des Messers kaum mehr das Gewirr durchdringen kann. Eine andere Malvacee (ein Abutilon?) fallt durch seine grossen gelben, am Grund purperbraunen Bluthen, welche an einem niedrigen, kriechenden kurzstachelichen Strauch mit handsörmig gelappten Blättern sitzen, angenehm auf, ebenso eine Rubiacee (Lasianthus sp.?) welche an der Spitze ihres kaum 3 Fuss hohen holzigen Stengels eine grosse scharlachfarbene Blüthenahre tragt, die sich später in einen Buschel leuchtendblauer Beeren verwandelt. Angeflogene und im Boden versteckte Samercien haben nun Zeit und Ruhe, um sich zu entwickeln. Da entfaltet sich denn zunächst ein stacheliges Durcheinander von (hie und da über mannshohen) Solaneensträuchern, wovon eine Art schöne, runde, goldgelbe Früchte hat, welche essbar sind und einen Geschmack besitzen, der an Stachelbeeren erinnert. Untermischt ist dasselbe mit einem als Panacee gegen Beriberi eine Zeit lang viel angepriesenen krautartigen Strauch, Clerodendron serratum, dessen Blüthendecoct als Daun singugu den armen Beriberi-Kranken dreimal täglich kaffeetassenweise eingeflösst wurde, ohne jedoch das Geringste zu helfen, wie ich mich durch eigene Versuche überzengt habe. Dazwischen fallen die grossen weissgrünen Blattflächen eines wilden "Kladi" (Caladium) in die Augen, welche für den Malaien. einfach abgebrochen und über den Kopf gehalten, einen billigen Regenschirm und, wenn dann weggeworfen, für die Pferde ein sehr beliebtes Scheuobiect abgeben. Die Wurzelknollen sind ein Leckerbissen für die Wildschweine. Weiter sind hervorzuheben eine mannshohe Composite mit weissfilzigen salbeiahnlich riechenden Blättern, deren ausgepresster Saft ebenfalls gegen Augenkrankheiten angewandt wird und an etwas feuchten Stellen, ein grosser fiederblättriger Strauch mit leuchtendgelben Bluthenkerzen, ebenfalls "gut für die Augen". Anziehend durch ihre vielen, schön violettrothen, grossen Blüthen ist eine Melastomacee, Melastoma decemfidum. Diese ganze bunte Gesellschaft, welche über und über gespickt und ausgeputzt ist mit den eleganten Wedeln unzähliger kleiner und grosser Farrenkräuter (hauptsächlich Polypodium sp.) wird nun tausendfach und undurdringlich umschlungen, durchrankt und verknüpft durch die zähen Lianen unzähliger Papilionaceen und Convolvulaceen, deren schone grosse Blumenkelche, die der ersten Familie gewöhnlich bläulich, die der

letzeren weiss, gelb oder rosa gefärbt, einzeln und in ganzen Trauben bald zwischen dem Sträuchergewirr am Boden hervorlugen, bald an zierlichen Guirlanden in dem Geäste der zahlreichen Bäume sich wiegen.

Meist nahe am Boden sich hinschlängelnd, doch auch bis zu ansehnlicher Höbe emporkletternd und besonders gern alte verlassene Ataplatten in Nu mit ihren grossblätterigen Ranken von oben bis unten einspinnend, helfen ausserdem noch eine unzählige Menge von Cucurbitacen mit prächtigen phantastisch ausgefranzten Blumen und Blättern das undurchdringliche Dickicht noch undurchdringlicher machen, sodass man ohne Hackmesser in ein solches nur wenige Monate altes Brachfeld nicht mehr eindringen kann.

Der Tollkühne, der es dennoch versucht, fühlt sich schon nach den esten Schritten von allen Seiten umschlungen und sestgehalten von den meist unsichtbaren dunnen Ranken, als wäre er an Händen und Füssen mit Stricken gebunden und ist schliesslich froh, wenn er sich wieder mit strickwarts concentriren kann. So vertheidigt die durch Menschenhand misshandelte Erde ihr neues Pflanzenkleid.

Zur Zeit der Fruchtreise kann man oft wunderschön gesärbte Früchte in diesem Lianendickicht erblicken, namentlich machen gewisse faustgrosse gelbrothe Aepfel (von Modecca-Arten?) in dem dunklen Laub cinen schönen Effect, ebenso eine kleine Cucurbitacee mit prächtigen kin ausgezackten Blättern und scharlachrothen, nussgrossen Früchten. Diese letztere gabe eine schöne, leicht zu ziehende Zierpflanze ab. Eine wh hanfige Bohnenranke, Bunga rankadei genannt (Mucuna pruriens) allt durch ihre dicken, vollen, über spannenlangen Blüthentrauben von dukelvioletter Farbe dem Blumenliebhaber besonders angenehm auf; er resucht vielleicht, sich eine solche Bluthe abzureisen. Frevelhaftes Begimen! Kommt seine Hand in dem Gewirr den fingerlangen, breiten, mit einem dichten, weisslichen Haarfilz überzogenen Fruchtschoten auch ur einen Moment lang zu nahe, so rächt sich dies sofort durch unertägliches Jucken der betreffenden Stelle. Nach ganz kurzer Zeit juckt s ihn plotzlich auch am Arm, in der Achselhöhle, am Hals und so witer an Brust, Bauch und Beinen, kurz am ganzen Körper, und zwar » heftig und brennend, dass der arme Mensch wider Willen sich unashörlich den ganzen Körper blutig kratzt. Man möchte zehn Hande baben, nur um sich überall zugleich kratzen zu können. Diese unerträgliche jeckende Pein, welche im Stande ist, Thranen in die Augen zu treiben, bet lange an, und man kann sich die Qual eines solchen Unglücklichen malen. Ich selbst hatte nur einmal, von den Malaien auf diese Teufelsbohne aufmerksam gemacht, eine Schote vorsichtig zwischen die Finge spitzen genommen; keine zehn Minuten danach hatte sich das fürchte liche Jucken schon über meinen ganzen Oberkörper verbreitet. Die kleine Haare, welche die Schote aussen bedecken, setzen sich in der Haut se und wandern, durch jede Bewegung ihres Opfers weiter geschoben, ub dessen ganzen Körper. Je schneller und heftiger also die Bewegunger desto schneller breiten sie sich aus. Die Malaien halten das Jucken fi so schrecklich, dass sie behaupten, Wildschweine, deren gewiss nich zarte Haut mit der Bohne in Berührung gekommen ist, walzten sich w närrisch auf dem Boden herum. Karbauen, denen die Haare ins Ol gekommen sind, sollen wüthend werden. Eine häufige Schlingpflanze i auch die bekannte Tuba (Anamirta cocculus?) deren ausgepresster Sa bekanntlich van den Malaien zum Fischfang benutzt wird. Für einen Flu von z. B. 30-50 Fuss Breite nimmt man den ausgepressten Saft vo etwa 3 Centnern Tuba, den die Leute im Kahn fahrend, über de Wasserspiegel hinspritzen; zuletzt wirst man auch noch das zerquetsch Kraut hinein. Zwei bis drei Stunden nachher beginnen die theils todte theils schwer betaubten Fische den Fluss hinabzutreiben, oft viele hunde Centner, und werden von den harrenden Eingebornen mit leichter Mah eingesammelt. Die betäubende Wirkung des Tubasaftes ist aussero dentlich stark und wirkt stets bis hinab zur Mundung des betreffende Flusses; desshalb werden auch gewöhnlich die Anwohner weiter unte am Flusse gewarnt, an der bestimmten Zeit weder selbst von dem Wasse zu trinken, noch ihre Ochsen oder Pferde zur Tränke zu treiben. Sogt die Krokodile an den Mundungen sollen von den herabschwimmende Tubasaste betaubt werden und regungslos für einige Zeit auf dem Grund liegen bleiben.

Noch bleibt eine interessante Pflanze zu erwähnen, namlich ein Vetreter der Aroideeen-Gattung Amorphophallus, welche man allübera ihre grossen, feingelappten Blattschirme ausbreiten sieht. Der dicke saftig Stengel des (einzigen) Blattes ist weisslich mit dunkelgrünen Flecken un Rauten geziert, fast wie der Rücken einer Pythonschlange und wen man denselben mit seiner auffallenden Sprenkelung zwischen dem Grüauftauchen sieht, muss man sich wirklich erst ins Gedächtniss rufen dass man es mit einem Blattstiel und nicht mit einer Schlange zu thu hat. Das Blatt, welches bei grösseren Arten bis zu 2 Fuss im Durch messer haben kann, entwickelt sich sehr schnell, fast über Nacht um oft an Stellen, wo man es gar nicht vermuthen sollte, z. B. aus der festgestampsten Erdboden neuerbauter Kulihutten oder mitten auf einer

neuen sorgsaltig gereinigten und aufgeschütteten Wege. Die Blüthe erscheint erst, wenn das Blatt abgestorben ist, und sitzt ohne Stengel direct auf dem Erdboden. Sie besteht aus einer schmutzigweissen Düte mit oben weissern, unten dunkel violettem Stempel und hat öfters bis m einem Schuh Durchmesser. Die viel besprochene Riesenblume, seinerzeit von dem italienischen Botaniker Beccari auf der Westküste Sumatra's ausgefunden, gehört bekanntlich in diese Gattung, und manche Exemplare Deli's, namentlich von einer riesigen Art aus den Vorbergen, mögen ihr an Grösse wenig nachstehen. Der ungeheure Fruchtkolben besteht aus hunderten scharlachrother Beeren bis zu Kirschengrösse. Das Merkwurdigste an der Pflanze ist jedoch ihr unsäglich aashafter Gestank. Wo solch ein Blumlein im Verborgenen bluht, da halt sich jeder Vortbergehende gewissenhaft die Nase zu. Seltsamerweise scheint der Geruch in einiger Entfernung stärker zu wirken, als wenn man die Nase unmittelbar an die Blume bringt, wenigstens kam es mir stets so vor. Einst, als ich mit dieser Eigenschaft des facalen Geruches noch nicht bekannt war, hatte ich eine solche Bluthe zum Trocknen in mein Herbarium gelegt und ging damit zu einem Bekannten auf die Veranda. Nach einiger Zeit entwickelte sich daselbst ein solcher Gestank, dass wir Alle uns unwillkürlich zunächst von der Reinheit unserer Fussbekleidung überzeugten und noch lange suchten, bevor wir den Uebelthäter in meinem Herbarium entdeckt hatten.

Wir wollen nunmehr die Baume etwas naher ins Auge fasen, die sich in diesen Strecken befinden und einsam ihre Aeste hier und dort gen Himmel strecken als letzte Ueberreste des früheren, längst niedergehautenen Waldes. Natürlich kann es sich nur um Baume handeln, die man aus diesem oder jenem Grunde absichtlich stehen gelassen hat.

Meist sind es Nutz- und Bauhölzer oder gětah (gummi) gebende Raume, kurzum solche, welche dem Menschen zu irgend etwas dienen. Doch finden sich auch Stämme, an welche sich der Mensch wegen dieser oder jener Eigenschaft nicht heran wagt. Ein solcher ist der Rangas-Baum, Gluta Benghas. In der Gegend von Mabar und Pertjut kann man besonders häufig Gruppen von 10—12 dieser schönen hohen Raume in den angepflanzten Feldern zerstreut sehen, welche man bei dem allgemeinen Waldmorde säuberlich hat stehen lassen. Warum? Weil dieser Baum gerade einen solch scharfen, giftigen Sast besitzt, der auf der Haut seines Mörders eine fast eben so furchtbare Entzündung zu wege bringt, wie der oben erwähnte Buta-buta. Kein Arbeitsmann wagt es, ihn zu sallen, und in den von Pslanzern an die Malaien oder Batta's

ausgegebenen Contracten zum Waldschlagen sind desshalb Rengasbaume ausgenommen. Merkwürdigerweise behaupten die Eingebornen einmüthig, dass beim Vollmond der Saft seine giftigen Eigenschaften verliere und der Baum dann ohne Schaden gefällt werden könne. Dies ist mir nicht nur hundertmal versichert worden, sondern ich habe auch die Leute, welche nach der Vollmondsnacht von der Arbeit kamen, untersucht, und keine Entzündung der Haut gefunden. Der Butabuta-baum besitzt diese Eigenschaft nicht, sein Saft bleibt auch in dieser Zeit giftig, wie mir ausdrücklich hervorgehoben wurde.

Das Holz des Rengasbaumes ist ausserordentlich hart und zah und wenig den Verwitterungseinflüssen zugänglich; man hat desshalb bei Anlage der Bahn von Labuan nach Medan die Eisenbahnschwellen vorzugsweise daraus hergestellt.

Ein anderer prächtiger Baum, der mit seinem vollen, dichten Fiederlaub und seinen zahlreichen goldgelben Blüthentrauben einen ausgezeichneten Anblick bietet, ist der bekannte Djuar oder, wie er in Deli genannt wird, Djohorbaum, Cassia florida. Der Kern des Stammes, teras djohor, welcher von einer weissen, leichten Holzschicht umgeben ist, ist dunkel schwarzbraun, sehr schwer und so hart, dass ein Nagel kaum eindringt, wesshalb er auch falschlich Eisenholz genannt wird.

Er ist einer der gemeinsten Baume in Deli, überall ausschiessend, namentlich in den Vorbergen, auf der Höhe etwa von Patumbah und Deli-tua, und bildete früher ganze Bestände. Dank des unsinnigen Wüthens der Pflanzer mit Feuer und Axt wurden hunderte der für Haus und Scheunenbau so unendlich werthvollen Stämme, welche man aus den für den Tabaksbau niedergeschlagenen Parcellen nicht herausschleppen wollte oder konnte, einfach zu Asche verbrannt und so kommt es, dass man wenig alte, grosse Stamme mehr sieht. Denn so schnell und gern der Baum im Beginn auch aufspriesst, so langsam wächst er später, wenn der eisenharte Kern sich zu bilden beginnt; ein zehnjähriger Baum hat erst einen ungefähr 2 Fuss dicken "teras". Dass das Djohorholz von wegen seiner beinahe unverwüstlichen Harte - ich habe Stamme gesehen, die, nach 5 Jahren aus dem Boden genommen, noch keine Spur von Verwitterung zeigten - für den Haus- und Scheunenbau, namentlich für die Grundpfeiler, unbezahlbar ist, kann man sich denken, und mancher Pflanzer, der früher aus dem Vollen wirthschaftend die werthvollen Stämme vergeudete, sucht nunmehr dem durch das bereits allzuweit gediehene Verschwinden der Wälder eintretenden Mangel an Bauholz durch Wiederanpflanzen des früher so leichtsinnig ausgerotteten Djohor zu steuern.

Eine andre, ebenfalls prachtig goldgelb blühende Papilionacee, Pteroturpus Indicus Willd., von den Malaien Kaju Sånå genannt, gehört
such zu den gewöhnlichen Baumen dieser Region, und wird nicht allein
wegen seines leichten, aber dauerhaften und namentlich schön gemaserten
Holzes, welches polirt einen prächtigen Goldglanz annimmt und desshalb
allgemein zu Messer- und Lanzenscheiden verarbeitet wird, sondern auch
wegen des lieblichen, veilchenahnlichen Geruches seiner Bluthen geschätzt.
Dieser ist so stark, dass ein bluhender Baum seine Umgebung weithin
mit lieblichem Duft erfullt. Ausserdem wird sein rother, eine Art Drachenhlut bildender, Saft als Politur und zu medicinischen Zwecken bei Diarrhöe
bezutzt.

Einsam, eine glatte, schlanke Riesensaule, noch laut von der verschwundenen Waldespracht zeugend, ragt hie und da aus den kahlen Feldern ein bis zu 150 Fuss und mehr hoher Toalangbaum empor. Hoch oben in der Achsel eines seiner kahlen Aeste ist ein grosser schwarzer, langlicher Fleck zu bemerken - ein Bienennest. Das ist ein sogenannter Bienenbaum, denn nur auf ihm siedelt sich die honigerzeugende Biene an, deren susses Product auch dem Malaien ein Leckerbissen ist, und deshalb sind auch diese Baume durch eine ausdruckliche Klausel in den von der Regierung an die Pflanzer ausgegebenen Landcontracten, ebenso wie die Fruchtbäume, vor dem Fällen geschutzt. Da, wo der Stamm dem Boden entsteigt, springen nach allen Seiten brettartige Strebekisten vor, welche offenbar dem Riesenstamme mehr Halt und Festigkeit geben sollen, da die meisten Wurzeln sich nur oberflächlich im Boden rebreiten. Diese vorspringenden Strebepseiler finden sich bei vielen Hochstammen und bilden mit einander, wenn gut entwickelt, rund um den Stamm wahre Kammern, die sogar oft durch natürliche Thuren mit einander verbunden sind und denen Nichts fehlt, als das Dach.

Den heiligen Waringinbaum brauche ich als vorhanden wohl nur zu erwähnen, da er in seiner Schönheit und Majestat von allen Reisenden angesinhrt und gepriesen jedem Gebildeten bekannt sein wird. Man sieht nur wenige Bäume in Deli, meist an heiligen Plätzen, sogen. Kramats. Ein schönes Exemplar steht an der Landstrasse von Labuan nach Medan. Ein eben solches habe ich 4000' hoch in den Battaländern an den Usern des Tobahsees gesehen. Ficus (Urostigma)-Arten von den Malaien pokon wa genannt sind überhaupt ungemein reichlich vertreten, von den grössten Bäumen, deren Früchte, ein von den grösseren pslanzenfressenden Vögen, namentlich Tauben und Nashornvögeln, sehr geliebtes Futter bilden,— (eine Covellia ?) mit rothen, birnsörmigen Früchten wird auch von

den Malaien als Buwah ara gegessen - bis zu den schwachsten Schling pflanzen, von denen mehrere der Gattung Fixus angehörende Arten s grobe Blatter besitzen, dass sie sich wie Schmirgelpapier anfühlen un sehr gut zum Poliren von Holz gebraucht werden können unter der Namen von Daun ampělas. Um die wilden Feigenarten gleich vollstandi vorzuführen, sei hier der wunderschönste und imposanteste zugleich auc der nutzlichste Vertreter der Familie angereiht, die Ficus (Urostigma elastica, der Kautschukbaum. Er ist ein Schlinggewachs, aber freilich von baumartigen Dimensionen. Mit hundert faust- bis schenkeldicken Arme unklammert er einen hohen Waldbaum, um sich oft über hundert Fus hoch an ihm empor nach Lust und Licht zu ranken; wenn sein Same zusallig in einer Rindenspalte oder einer mit etwas verwittertem Pflanzen humus versehenen Astgabel entkeimt ist, so breitet er sich nach 2 Seiter aus, seine Blattkrone nach oben, seine Stamme und Luftwurzeln nach unten. Das arme unklammerte Opfer siecht bald dahin und erstick schliesslich unter den eisernen Umschlingungen des furchtbaren Würgen Wehe, wenn der Mörder bis zu diesem Zeitpunct noch nicht stark genu ist, auf eigenen Fussen zu stehen! Umbarmherzig reisst ihn dann sei Opfer mit zu Boden, und selten mehr ist er im Stande, sich wieder empo zu heben aus dem tödtlichem Moder zu den andern Baumkronen in de belebenden Aether! Vermag er aber auf seinen Dutzenden dunner, durch einandergeschlungener Beinchen sich zu erhalten, so bröckelt der todte umschlungene Stamm langsam heraus, und es bleibt dann ein Gebild stehen, das durch seine bizarren, wunderlich in einander gewirrten Former die kuhnste Phantasie überflügelt. Der Anblick eines auf sich selbs dastehenden grossen Kautschukbaumes mit seiner dichten Krone grosser prachtvoll gruner Blatter, seinen vielen Luftwurzeln und seinem merk wurdig aus lauter kleinen Saulen zusammengesetzten Stamm gewährt eines herzerhebenden, grandiosen Anblick, und Liebhaber pflanzen den dankbar leicht und schnell aufspriessenden Baum zur Zierde in ihrem Garten.

Beim Einschnitt in die Rinde quillt ein dicker, milchweisser Saft her aus, der nach einigen Augenblicken an der Luft zu dem bekannten Kautschuk oder Gummi elasticum erhärtet. Die Malaien nennen densel ben Getah rambung und sammeln ihn zum Verkauf. Die Rinde solche Baume ist daher über und über mit tausenden von Narben früherer Ein schnitte bedeckt. Dass ein solcher Safteverlust den Baum natürlich furchtbar schwächt, ist begreiflich. Die Procedur des Gummigewinnen darf daher nur alle paar Jahre, gewöhnlich 3 oder 4, stattfinden. Die Kautschuk ein sehr gesuchter Artikel ist und gut bezahlt wird, haben

sowohl Malaien als europäische Pflanzer Versuche gemacht mit Anpflanzen (aus Stecklingen) aber wie mir scheint ohne besondere Energie, da der Baum erst nach 8—10 Jahren nutzbar wird und der Tabak vorderband noch einen viel zu grossen Gewinn abwirft.

Schliesslich will ich noch eines sich überall eindrängenden, niedrigen Bannes mit voller, fast bis auf den Boden gehender, weisslich grüner Krone und schon violetten, grossen Blüthenbüscheln gedenken, der durch seine Häufigkeit zu einer der characteristischsten Pflanzen dieser Region wird, wahrscheinlich eine Calophyllum-Art. Wegen ihres Nutzens fallen noch z Euphorbiaceen zu erwähnen, baumartige Sträucher, den Gattungen Cyclostemon und Bridelia angehörend; erstere von den Malaien Belassitjo, letztere Tjinip genannt, deren Saft man zum Braunfärben und Wasserdicht machen der Fischnetze und Angelschnure gebraucht.

Hier und da wird der Brachfeldflora 'ein gewissermasser fremdländischer Stempel aufgedrückt, indem einige Pflanzen, sei es durch Zufall oder Absicht, aus anderen Landern hierher gelangten und sich stark entwickelten. Darunter sind hauptsächlich zwei, eine feuerfarbene Lantana sp. und die Mismosa pudica.

Beide waren in Deli vor 10 Jahren noch nicht wahrgenommen und sind von Singapore oder Penang eingeschleppt. Dortselbst bilden die beiden das gemeinste Unkraut und wird namentlich die Lantana ihres dichten, schlingenden Wuchses und ihrer zahlreichen, feuriggelben Blumen vegen allenthalben als Gartenhecke verwendet. Sie wuchert ungemein stark; auf Java und Ceylon habe ich ganze Bergseiten von ihr überzogen gesehen, so dass keine Pflanze daneben aufkommen konnte. Vermöge dieser ungeheuren Lebenskraft hat sie auch an verschiedenen Stellen in Deli sich eingenistet und es wird nicht mehr lange dauern, bis sie anch dort alles Andre überflügelt. Auf der Strecke zwischen Medan und Gedong Djohore, wahrscheiulich ihrem ersten Standort in Deli, ist dies jeux schon der Fall. Die Mimosa pudica habe ich 1881 selbst von Singapore nach meinem Wohnort in Serdang hinübergebracht, um sie im Garten zu pflanzen. Anfangs waren es nur 2 oder 3 Straucher, aber schon nach einem Jahr hatte sich die Pflanze über alle angrenzenden Felder verbreitet und wuchert nunmehr unausrottbar daselbst. Jedermann it ja die Eigenschaft dieser Minose bekannt, bei der leisesten Berührung ihre zarten Fiederblättchen zusammenfalten und bei etwas stärkeren Contusionen sogar die Blattstiele flach niedersinken zu lassen. Doch bleibt es stets ein merkwürdiger und interessanter Anblick, wie unter dem wandelnden Fusse sich die lachende grune Flur urplötzlich in ein traurig, braunes, blatterloses Steppengestrupp zu verwandeln scheint. Die Spueines Menschen oder Thieres lässt sich viele Stunden lang — manch sagen, bis zum nächsten Morgen — an den sterilen braunen Streife erkennen. So lange dauert es, bis die schamhaste Pflanze ihre insultirte Blättchen wieder auszubreiten wagt.

Nunmehr noch ein Wort über die Graswüsten (Savanen), die bekant ten Lalangfelder, welche in Deli an trockenen Stellen bis zum Meere gestade hinabsteigen, obwohl sie ihre grösste Ausdehnung und Entwick lung erst in einer Höhe von etwa 3000 Fuss z. B. dem Plateau vol Tobah, erreichen. Lalang wird das Wort in Deli gesprochen, nich Alang-alang und bezeichnet jenes steife bis zu 6 Fuss hohe, harte, spitt Gras, Imperata (arundinacea? Cyrill.), welches alluberall in Indien in erstaunlicher Menge wuchert, überall sich eindrängt und kaum, selbi nicht durch tüchtiges Umgraben, auszurotten ist. Es gibt nur ein Mit tel, diesen frechen Ueberall und Nirgends sicher zu tödten, und das sin Fusstritte, vieltausendmal taglich wiederholt, mit anderen Worten: be gangene Wege. Auf neu begangenen Pfaden stirbt das Lalanggras sofot radikal ab, aber nur gerade eben so breit als die Fusssohle den Bode benahrt. Rechts und links stehen die Halme 5-6 Fuss hoch, ihre Spit zen neigen sich über dem schmalen Ffad zusammen, so dass derselb von oben oder aussen absolut unsichtbar ist und der tastende Fuss nu durch eine glatte graslose Rinne vergewissert wird, dass er sich at dem richtigen Weg befindet.

Diese Pfade bleiben, nachdem sie ausser Gebrauch gesetzt sind, trott ihrer Kleinheit und Schmalheit noch Monate, beinahe Jahre lang glat und rein von Lalang, so gross ist die Abneigung desselben vor hart getretenem Boden. Es gibt in Deli Lalangselder von vielen Stunden Aus dehnung, sowie kleine Fleckchen von nur wenigen Quadratmetern Um fang, die oft mitten im Wald, an ganz unerwarteten Stellen, auftreten Könnte man Deli aus der Vogelperspective betrachten, so wurde mas dessen dunkeln Waldmantel vieltausendfach geflickt finden mit vielge staltigen, hellgrunen Lalangfeldern. Fast überall verdanken die Lalang felder, namentlich die kleinen, ihre Entstehung einer verlassenen Cultur Ein Malaie legt sich an einem beliebigen Punct ein Haus oder ein Feld an; taugt ihm dasselbe nicht mehr, so siedelt er sich wo anders an und die verlassene Waldblösse wird zur Lalangwiese, ehe noch Bäume und Sträucher Zeit haben, sich zu entwickeln. Oft kann man noch aus der Graswuste die verkohlten oder verfaulten Balken des ehemaligen Hausel hervorragen sehen. Wo man also ein Lalangfeld erblickt, kann man

sets mit ziemlicher Sicherheit auf früheres Culturland schliessen; im Urwald wachst dieses Gras nicht. Ein Grasseld von grosser Ausdehnung ist in Deli z. B. der "Lalang matianak" bei Patumbukan Kotozan. Lalang metianak (mati anak: todtes Kind oder: Tod der Kinder) ist ein Name, der bei vielen grossen Lalangfeldern wiederkehrt und die Grösse derselben veranschaulichen soll, da ein Kind, dass sich darin verirrt, nicht mehr lebendig herauskommt, sondern vor Sonnenbrand und Durst zu Grunde geht. Es sieht ziemlich trostlos aus, ein solches Lalangfeld; mit Ausnahme einer sehr spärlich zerstreuten, gelbblühenden Akazie, die in einzelnen Buschen hie und da wächst und gewöhnlich umrankt wird von einer Rubusart mit veritablen, aber völlig geschmacklosen Himbeerfrichten, erblickt das Auge auf Stunden hin Nichts als das Starre, rauhe Lalanggras, dessen scharfe Blattränder die Hände verwunden und dessen harte Spitzen, gerade in Kopfhöhe, die Augen des Wanderers bedrohen; ich habe schon viele bösartige Hornhautgeschwure gesehen, die durch den Stich der Lalangspitzen enstanden waren. Als Oasen in dem Lalangmeer sieht man oft kleinere oder grössere Colonien eines andern Grases (Anthistirium sp.) welches fast die doppelte Höhe des Lalanggrases erreicht. Ein paar Blumchen, die diesen Graswusten eigenthumlich sind, verschwinden ganz zwischen den Halmen. So namentlich eine blaulichviolette, gentianenartige Blume (Exacum sp.?) und ein kleines, niedriges Kräutlein mit auf dem Boden liegenden, hübschen, weissen Blumensternen (Agrostemma sp.?), dies jedoch nur in den höheren Gegenden und vornehmlich auf den vom Wald eingeschlossenen Savanen. An Stellen, wo der Lalang nicht belästigt, d. h. nicht niedergebrannt oder umgegraben wird, sinken die abgestorbenen Halme Jahr um Jahr m Boden, verrotten aber nur langsam und bilden dann eine bis zu halbmannshohe Moderschicht, über der jedoch triumphirend die grünen Fahnen des lebendigen Grases wehen, so dass von dem Moder und der Faulniss darunter Nichts zu sehen ist. Dies ist ein beliebter Aufenthaltsort der Wildschweine, welche sich darin weitverzweigte tunnelartige Gange aushöhlen 1). Ungeheuer ist das Wurzelgewirr dieses Grases und dicht ineinander gefilzt wie Torf; man könnte fast behaupten, dass der Boden einer Savane mehr Wurzeln als Erdkrumen enthalte. Daher ist auch begreiflich, dass, wo das Lalanggras einmal Wurzel gefasst hat, es bald jeden anderen Pflanzenwuchs erstickt. Die Tabakspflanzer in Deh hielten früher auch dieserhalb den Savanenboden für steril und

¹⁾ Cf. weiter unten.

ausgesaugt; Versuche haben sie jedoch bald von der Unrichtigkeit dieser Ansicht überzeugt 1).

Um nun schliesslich auch etwas Gutes von diesem nichtsnutzigen Gras zu berichten, sei erwähnt, dass seine getrockneten Halme vielfach an Stelle des Atap zu Dachbedeckungen verwendet werden; auch können dieselben zur Papierbereitung dienen (in Java trug man sich eine Zeit lang mit dem Gedanken einer grossen Lalangpapierfabrik). Die chinesischen Kulis gebrauchen dasselbe zum Bedecken der jungen Tabakspflänzchen und das Decoct seiner Wurzeln ist ein vielgebrauchtes Diaphoreticum.

Und nunmehr, mein werther Leser, nimm all' Deine Phantasie und Vorstellungskraft zusammen, um mir zu folgen in den voll heiliger Majestat vor unsern Blicken sich ausdehnenden Urwald! Urwald! Was erweckt dies eine Wort doch in dem empfänglichen Menschen für eine Menge wunderbarer Vorstellungen! Für mich war dasselbe von Kindesbeinen an der Inbegriff alles Erhabenen und Grossartigen, bei dessen Klang heilige Schauer, halb Furcht, halb Neugier vor dem Unbekannten, die jugendliche Seele durchzitterten mit zauberischer Poesie. Im Hintergrunde spukten dabei noch nebelhafte Vorstellungen von phantastischen Abenteuern in seinem dunkeln Schoosse, von Indianern und wilden Thieren. Und heute noch, wo ich schon jahrelang tagtäglich die schattigen Hallen desselben besucht und durchforscht habe, hat mir das Wort Nichts von seiner Zauberkraft verloren; ein Gefühl der Ehrfurcht beschleicht mich jetzt noch so gut wie in meinen Jugendjahren beim Anhören oder Aussprechen desselben, und ich habe, als ich noch mit der Buchse darin umherpurschte, unjägerhaft genug, schon manchen guten Schuss versaumt, um die traute Poesie, welche mich rings umfing, nicht durch den Knall meiner Buchse zu stören. Doch halt! da merke ich eben, dass meine Phantasie mit mir durchgehen und mich von meinem vorgesetzten Zwecke abbringen will; daran ist eben wiederum das Wort Urwald mit seinem seltsamen Reiz schuld! Urwald! Wo gibt es den heutzutage noch in Deli? In der Kustenebene nicht mehr; da hat die kleine, schwache Tabakstaude all' die Legionen der Riesenbaume besiegt und verdrangt und sie haben sich hinaufgestuchtet in die Falten und Hange des Batta-Gebirges, wo der Europäer mit seiner Axt noch nicht hingedrungen ist. Lange werden sie auch dort nicht mehr existiren;

¹⁾ Auch Mohnike l. c. p. 180 behauptet, das Alang-alang-Gras sei "Kenn- und Wahrzeichen eines sehr sterilen Bodens."

ein boser Anfang zur Entwaldung der Gebirgsflanken ist schon gemacht, und bald wird der jungfräuliche Urwald in Deli nur noch zur den Legenden gehören.

Um zu ihm zu gelangen, müssen wir erst eine Zone überschreiten, wo frisch gefällte Stämme zu tausenden haushoch über einander liegen und nur einzelne Riesen, deren gewaltige Saulen jeder Axt spotten, noch trotzig aus dem Gewirr emporragen; doch auch für sie ist schliesslich ein Krautlein gewachsen - das Feuer; in einer Höhlung zwischen den Wurzeln oder Strebepfeilern angefacht, frisst es sich langsam, aber sicher in den machtigen Stamm hinein und innen im Kern hinauf, oft ohne dass man es von aussen wahrnehmen könnte, wenn nicht ein kleines Ranchwölkchen, welches oben in schwindelnder Höhe aus einer unsichtbaren Spalte emporsteigt, uns anzeigte, wie weit das Verderben im Innern schon fortgeschritten ist. Dreissig Tage lang brennt oft so ein Gewaltiger, ehe er mit donnerndem Krachen niedersturzt. Duster und schwermutsvoll rauschend muss der dahinterstehende Wald der furchtbaren Vernichtung, welche im nachsten Jahr auch ihn ereilen wird, zusehen. Wir konnen durch den Topass, wie dieses Feld der Verwüstung mit einem Pflanzer-terminus genannt wird, unmöglich zu ihm hingelangen; wenden wir uns also ab von diesem grauenhaften Bilde, welches dem Auge des Botanikers und Naturfreundes Thranen erpressen könnte, und suchen wir zum Durchdringen eine bessere Stelle, nämlich ein altes abgepflanztes und verlassenes Tabaksfeld; allerdings ist es mühsam und cofordert stets das Kappmesser, den Parang der Malaien, um sich durch das neu aufschiessende Gestrupp und Gewirr, welches wir weiter oben schon zu beschreiben versucht haben, einen Weg zu bahnen, dafür aber wird unser durch den vorigen Anblick verletztes Auge wieder versohnt, wenn es sieht, mit welch' riesiger Wachsthumskraft sich der so brutal niedergeschlagene Wald wieder zu bilden sucht. Ausser dem schon füher erwähnten Gewirr der Kräuter und Sträucher, namentlich der Solaneeen und Aroideeen, wird unser Blick angezogen durch die wunderbare Schnelligkeit, mit der sich ein Baum, von den Malaien Kaju tambang genannt, entwickelt. Es ist einer der gemeinsten Baume mit leichtem, weissem, unbrauchbaren Holz, der nach dem Verlassen eines Feldes wfort überall aufspriesst. Er hat noch kein Jahr nöthig, um sich mit arm- bis schenkel-dicken Stamm funfzehn bis zwanzig Fuss hoch zu erheben. Da er gesellschaftlich lebt und ganze Bestande bildet, so hat er das Feld schnell wieder mit einer Walddecke überzogen, unter deren Schutz sich die Samen und noch am Leben gebliebenen Wurzelstöcke des fruheren Waldes wieder entwickeln und neue Schösslinge treiben können. Auch hierin zeigt sich wieder die ungeheure Lebenskraft der Pflanzen in heissen Ländern: Wurzelstöcke, die auf der einen Seite vom Feuer schwarz verkohlt sind und 6—7 Monate den glühenden Strahlen der Sonne ausgesetzt waren, beginnen wieder auszuschlagen, sobald sich der wohlthätige Schatten des Tamba-Gehölzes über sie ausbreitet.

Doch da haben wir uns nun hindurch gearbeitet durch das Brachfeld und stehen am Rande des Waldes. Eine dichte Hecke von Rubus-Arten, Rottanranken, kletternden Gräsern und Selaginellen, die bis zu 10 Fuss und mehr in die Bäume steigen, zieht sich an seinem Saume entlang, und verwehrt uns den Eintritt; wir dürfen froh sein, wenn wir eine Lücke finden, die uns hindurchzuschlüpfen gestattet. Doch wollen wir ihn uns zunächt etwas von aussen betrachten. Fünfzig bis sechzig Fuss über dem Boden wölbt sich lückenlos das grüne Laubdach, über demselben erheben sich jedoch wieder — ein zweiter Wald über dem Wald — die einzelnen Kuppeln ungeheurer Waldriesen, welche schon aus der Ferne Staunen und Bewunderung einflössen. Zahlreiche elegante Wedel verschiedener Nibungpalmen (Areca, Caryota) wiegen sich ebenfals darüber an dünnem, schwankem und doch an die 80 Fuss hohem Stamme, gleich als wären sie express zur Verzierung in dieses grüne Riesenbouquet gesteckt.

"Wer zählt die Völker, kennt die Namen" aller der Arten, welche hier sich zusammendrängen? Wie viele Jahre unermudetsten Forschens und Sammelns wurden dazu gehören, auch nur annahernd den Reichthum dieser Walder kennen zu lernen! Denn nur wenige Species wachsen gesellig, wie bei uns in Europa, wo man von Eichen-, Buchen-oder Fichtenwaldern sprechen kann; hier steht Alles durcheinander, so zu sagen wie Kraut und Rüben; die heterogensten Formen finden sich bei einander, wie es eben gerade der Mutter Natur beliebt hat, ihre Samen auszustreuen. Etwas fallt einem beim Betreten eines richtigen Hochwaldes sofort auf, weil man es, verführt durch die phantastischen, aber sehr oft mit der Wahrheit nicht ganz sich deckenden Berichte poetischer Reisenden, eigentlich nicht erwartet hatte; das ist das schwache Vorhandensein des Unterholzes: Die dichte compacte Belaubung erzeugt ein beständiges Halbdunkel und lässt keine Sträucher, geschweige denn eine Gras- und Kräuterdecke aufkommen; der Boden ist beinahe nackt und kahl, nur von abgefallenem Laube und modernden Baumstammen und den armdicken blätterlosen Stricken niedergesunkener Lianen, dagegen nur von wenig lebenden Sträuchern bedeckt, welche dem Wanderer fast gar kein Hinderniss bieten, so dass das Hackmesser nur selten Arbeit findet. Alles drängt sich eilfertig nach oben über die dumpfe, schwere Laubdecke hinaus dem belebenden Licht- und Luftstrom entgegen, sei es selbständig, sei es an andern sich emporrankend; wer das nicht vermag, geht zu Grunde; auch ein zwar stummer aber ernster Kampf um's Dasein! Das Bedürfniss nach Licht und Luft zieht niedrige Büsche bohnenstangenähnlich in die Hohe, und junge Bäumchen verwenden ihre ganze Kraft so ausschliesslich auf das Längenwachsthum, dass sie bei kaum mehr als Daumendicke schon zwanzig und mehr Fuss hoch sind. Kann sich einmal die Krone im Lichte baden, so ist das Spiel gewonnen, und das Dickenwachsthum wird rasch nachgeholt.

Wer die Schwierigkeit kennt, welche dem Forscher die Erlangung von bimhentragenden Zweigen hoher Waldbaume bereitet, der wird kaum erstaunen, wenn ich mich völlig ausser Stande erkläre, auch nur eine ansthernde und noch so allgemein gehaltene Uebersicht der Baumformen zu geben, welche einen Deli'schen Wald zusammensetzen, um so weniger, als ich, wie schon Eingangs bemerkt, die Botanik nicht zu meinem Specialstudium erwählt habe und ihr nur den allerkleinsten Theil meiner so vielfach in Anspruch genommenen Zeit widmen konnte. Ich kann desshalb nur einige Baume aufführen, welche durch ihren Nutzen oder irgend eine andere Eigenschaft bei den Eingeborenen bekannt und mir mitgetheilt worden sind. Darunter sind zunächst einige gute Bauhölzer zu erwähnen.

Ein solches ist das Kaju bintangu (Bischoffia javanica Bl.) welches ein sehr fein geadertes dunkles Holz besitzt, das von den weissen Ameien nicht angegriffen wird. Ein anderes, sehr hartes weisses Bauholz ist das Kaju alaban oder laban (Vitex pubescens Vahl., Verbenacea), ebenso das Merebau eine Jutsia (Palembanica?) Miquel, eine Papilionacee. Sehr brauchbar ist ferner das Kaju simpur, verschiedene, grosse, volle, sozusagen breitspurige Bäume mit dichtem glänzenden Laub (Wormia sp.), welche zur Bluthezeit über und über mit grossen goldgelben oder veissen Blumen bedeckt- sind, und das mehr schlanke, in der Bluthezit violettroth prangende Kaju bungur (Lagerstromia reginae) (s. S. 2) Ausserdem werden noch mehrere Calophyllum-Arten verwendet. Ob dasselbe auch mit verschiedenen Eichenarten der Fall ist, welche in diesen Wäldern schon bei 100 Fuss Meereshöhe vorkommen, kann ich zur Sunde nicht angeben. Natürlich sind der guten Bauhölzer ausser diesen und den fruher erwähnten noch eine ganze Menge, die mir nicht bekannt wurden. Ein Beweis dafür ist, dass in den letzten Jahren zwei

Dampfsägereien auf der Ostküste errichtet wurden, von denen allerdings die eine wieder einging, aber nicht aus Mangel an gutem Holz, und es ist zu hoffen, dass durch die dabei beschäftigten Herren noch manches gute Holz aufgefunden und bekannt gemacht wird. Einen löblichen Anfang hat schon der Director der einen Sagerei Herr F. Kehding, deutscher Consul in Deli, durch Sammeln von Holzproben und Blüthenzweigen gemacht. Im Sultanat Serdang wächst ein Baum, Saprosma arboreum Bl., Rubiaceen, dessen festes, braunliches Holz sich ebenfalls gut zu Bauzwecken eignet, aber es hat eine sehr üble Eigenschaft, es stinkt "salva venia" so stark und mit einem so ausgesprochen facalen Geruch, dass sich jeder mit Abscheu von ihm wendet. Daher haben ihm auch die Eingeborenen den Namen Stinkholz (Kaju tahi) gegeben; das Unangenehmste ist dass das Holz, frisch geschlagen, fast gar keinen Geruch besitzt, derselbe entwickelt sich erst nach einiger Zeit, wenn das ursprünglich helle Holz sich dunkler zu färben beginnt. Unbekannte können desshalb sich leicht verleiten lassen, das Holz zu Bauzwecken zu verwenden. Ich erinnere mich, dass ein Bekannter in seinem neuen Hause aus Unkenntniss einen Balken dieses Holzes eingezogen hatte. Tage- und tagelang suchte man nach der Ursache des furchtbaren Latrinengeruches, der in dem halbsertigen Hause herrschte, und bei Regen- oder feuchtem Wetter stets viel stärker auftrat als bei trockenem; endlich entdeckte ein alter Malaie den Uebelthater und mit der Entfernung desselben war auch der Geruch definitiv verschwunden. Das Holz ist keineswegs häufig und soll nach den Versicherungen erfahrener Malaien nur local in einigen Strichen von Serdang vorkommen, wo ich es selbst bei Tandjong-Morawa beobachtet habe. Späne desselben werden allenthalben in den Kramladen Deli's besonders bei den Klings, feilgehalten und gegen verschiedene Krankheiten, besonders "Nervenanfalle" angewandt, auch legt man sie in Kleidertruhen, um durch ihren Gestank die Motten, das heisst den Teufel durch Beelzebub, zu vertreiben, aber es gibt eben nicht wenige Eingeborne, welche den Geruch geme haben, und malaiische Dandy's verwenden dies Odeur sogar mit Vorliebe bei der Bereitung ihrer massenhaft gebrauchten Parfumerien. De gustibus etc. Ein stattlicher Baum, der in diesen Wäldern keineswegs selten, aber auch nicht zu häufig ist, ist der Benzoe-Baum, von den Malaien Kaju keminjan genanut, Styrax Benzoin und subdenticulata Miquel, welcher das bekannte wohlriechende Harz liefert, das zur Herstellung von Medicamenten, Weihrauch und Raucherkerzen so vielfach verwendet wird. Auch in Deli wird es massenhaft zu Räucherzwecken verbraucht

und ist in grossen centnerschweren Blöcken überall auf den Passar's vonathig; bei jedem eingeborenen Kranken wird noch, bevor man zur Bekampfung der Krankheit schreitet "Keminjan" verbrannt, was den bei dem oft haarstraubenden Schmutz und Unrath in den dumpfen finstern Löchern, in denen namentlich die Chinesen hausen, eine wahre Wohlthat für die Nase ist.

Den Dipterocarpeen gehören einige Bäume an, welche das bekannte Damarharz liefern, das dem Eingeborenen zur Bereitung seiner Fackeln mentbehrlich ist. Zu diesem Behuse wird das rohe, sehr verunreinigte Harz mit der Rinde und etwas Oel vermischt mit Palmblättern umbunden und die Fackel ist sertig.

In den etwas höheren Bergstrecken muss auch der berüchtigte javanische Giftbaum (Antiaris, Fam. Artocarpeae) vorkommen; wenigstens vergitten die Batta's dieser Gegenden ihre Blasrohrpfeile mit einem Upas genannten Baumsaft, dem sie Tuba beimischen. Getah (= Gummi, Han) führende Baume, meist den Artocarpeen und Guttiferen angehörig, gibt es eine ganze Menge; fast aus jedem dritten Baum quillt beim Anschneiden der eine oder andere dicke Saft, der jedoch höchstens zur Bereitung von Vogelleim oder zum Haltbarmachen der Fischnetze von den tragen Malaien gebraucht wird. Sicherlich könnte ein erfahrener Fachmann hierin noch manches Neue und Brauchbare entdecken. Die richtige Getah pertyah, Isonandra gutta, habe ich dagegen nicht gefunden, ebensowenig das Kaju balam (Bassia balem Miq., Sapotaceae), welches ebenfalls eine mindere Sorte von Getah pertjah liesert, und desen Frachte, Buah balam, aus denen ein immer mehr in Aufschwung kommendes Oel gepresst wird, Minjak tengkawang, einen bedeutenden Ausfuhrartikel aus dem benachbarten Sultanat Siak bilden.

Auch einen Zimmtbaum (Cinnamonum!) glaube ich bestimmt als vorkommend angeben zu können, obwohl ich den Baum nie sah, sondern nur ein einziges Mahl roch, als ich durch frisch geschlagenen Wald ging. Einer der umgehauenen Baume duftete gar lieblich und mit ausgesprochenen Zimmtgeruch; trotz aller angewandten Muhe konnte ich aber nicht den Stamm unter den vielen über- und durcheinanderliegenden berausfinden. Kawah rimba (Waldkaffee) wächst sehr häufig an lichteren Stellen, die auch kleineren Baumen sich zu entwickeln gestatten; ob es aber eine wahre Coffea ist, kann ich nicht entscheiden, obwohl Blatt und Wuchs ganz mit dem zahmen Kaffeestrauch übereinstimmen, da ich niemals Blüthe oder Frucht gefunden habe. Auch eine Pala rimba (Waldmuskatnuss), Myristica! sp. kommt vor.

Wir wollen nunmehr etwas näher die Formen betrachten, welche dem Wald sein tropisches, phantastisches Aeussere verleihen, die Schmarotzer, die Epiphyten. Die kleineren jungeren Baume tragen gewöhnlich Nichts oder doch nur kleine, wenig in die Augen fallende Exemplare, aber wo ein alter, hoher, knorriger Baum mit weitverzweigten Aesten und rauher, rissiger Rinde, etwa ein Feigenbaum, womöglich mit Astlöchern und etwas angefault, sein umsangreiches Haupt erhebt, da ist das Paradies der Epiphyten; hier siedeln sie sich an, dass die Aeste beinahe brechem und kein Stückchen der Rinde sichtbar bleibt. Stundenlang kann man bewundernd vor einem solchen Gebilde stehen, dass Einem vor lauter Hinaufschauen der Nacken weh thut, und immer und immer wieder wird man etwas Interessantes, Neues, Malerisches erblicken. Lange Draperien und Fahnen schmaler, langblätteriger Farrenkräuter hängen da zwischen holzigen Loranthus-Sträuchern herab, die riesigen, mehrere Fuss im Durchmesser haltenden Blattrosetten des Asplenium Nidus Avis schmucken malerisch die Astgabeln, ja sie hängen sogar oft nur an einem Lianenstrick frei schauckelnd in der Luft wie ein Kronleuchter, prachtvolle Platycerium-Arten umschlingen mit grossblätterigen Guirlanden den Stamm, der durch die dichten Netze des Alles überziehenden Asplenium minimuslarifolium wie geschuppt erscheint, das Lycopodium Hippuris sendet seine eleganten Fransen und Quasten hernieder, und, damit auch die Blumen in diesen hangenden Gärten nicht fehlen, so entzücken eine Anzahl athmosphärischer Orchideen mit ganzen Sträussen und Aehren ihrer wunderbar gestalteten Schmetterlingsbluthen unsere Augen.

In den niedrigen Gegenden sind es meist nur kleine unscheinbare Arten, Sarcanthus, Aporum, Podochilus, von grösseren die überall gemeine Cymbidium tricolor Miq. und C. aloifolium Sw. mit gelbrothen und mehrere Dendrobium-Arten, worunter Dendrobium crumenatum, mit blendend weissen, lieblich dustenden Blüthenahren. Auch ein kleines weisses Cypripedium habe ich gesunden. In den höheren Regionen der Bergwalder jedoch kann man zwei prächtige Coelogyne-Arten sehen, wovon die eine vielleicht eine Varietät von C. speciosa oder eine neue Species sein dürste. Ein sünstägiger Aussug in die Bergwälder der Pslanzung Petimus lieserte mir etwa 18 Orchideen-Arten, von denen die meisten jedoch nicht in Blüthe und desshalb nicht zu bestimmen waren. Dort sand ich auch den Riesen unter den Orchideen, Grammatophyllum speciosum; die beblätterten Stengel schauten wie eine kleine Zuckerrohrpslanzung auf mich herab, und der Blüthenstengel, der etwa hundert grosser, braun- und gelbgesleckter Blüthen trug, mass zwölf Fuss in der Länge! Ich liess einen kühnen Batta

imanf steigen und zwei der Stengel nebst dem Blüthenstand abschneiden; dieselben bildeten zusammen beinahe eine Mannslast. Auch Dendrohim lineatum habe ich aus den Battabergen erhalten und eine andere
Dendrobium-Art mit kleinen, unscheinbaren, grünen Blüthchen, aber sehr
aromatisch riechenden Blättern, die selbst bein Trocknen ihren Wohlgemich nicht verlieren. Die Batta's binden dieselben oft rosettenartig um
einen Stachelschweinkiel zusammen und stecken dies auf ihr Kopftuch.
Dieser Kopfschmuck, Kupiah genannt, gewährt gar keinen übeln Anblick.

Ein Wald zwischen den Wendekreisen ohne Lianen wäre gar nicht denkbar, da auch sie ebenso gut wie die Epiphyten dem Walde erst sein tropisches Gepräge aufdrücken. Wir können zwei Formen unterscheiden; kleuernde Lianen, die fest dem Baume anhasten und ihn hie und da vielfach in malerischen Windungen umschlingen, ja ihn mit mörderischen Amen oft sogar erdrosseln, wie die Ficus-Arten, und in frei rankende, welche nur hie und da einen Stutzpunct nöthig haben, sich von einem Baun zum andern schlingen und den Wald oft auf lange Strecken hin reminden und verknupfen. Zu der ersten Form gehört eine Liane (Aristoleckie sp.), deren holziger daumendicker, über und über mit stumpfen Höckern besetzter Stamm in die höchsten Baume steigt. Die Malaien nennen ihn Akar kaliali und gebrauchen das Decoct seiner bitteren Stengel als Mittel gegen Fieber. Ferner gehören dahin die vielerlei Fuus-Arten, die kletternden Farrenkräuter, wie Platycerium und ausser den Piperaceen, die wir etwas später noch besprechen wollen, die Kletteraroideen, diese verkwurdigen, ganz aus der Art geschlagenen Pflanzen. Während alle anderen Aroideen hübsch am Boden und am liebsten im Sumpfe bleiben, ohne selbst einen Stamm zu besitzen, klettern diese übermüthigen Springinsfelde mit holzigem Stengel hohe Baume hinauf.

Ein ebensolches aus der Art geschlagenes Wesen ist eine kletternde und rankende Orchidee, die aber ziemlich selten ist, eine Galeola-Art?, und an ihren blatterlosen Ranken schmutziggelbe Blüthenbüschel in burzen Zwischenräumen trägt. Ich habe dieselbe schon an alten Baumstammen nicht weit vor der Küste (oberhalb Labuan) gesehen. Beiläufig will ich auch hier noch des schönen Aeschynanthus Lowii gedenken, der besonders gern alte abgestorbene Zuckerpalmen umrankt und mit seinen violetten Blumenkelchen gar lieblich aussieht. Unter den frei rankenden Lianen im Hochwald müssen wir zunächst eine schöne Hoya-Art (Asclepiadeae) erwähnen, deren herrliche mit dunkelsaftgrünen Blättern und zahlreichen Büscheln von Wachsblumen gezierte Festons den durchflochtenen Bäumen zum besonderen Schmuck gereichen. Als mächtige, faust-

oft sogar schenkeldicke holzige Strange ziehen sich die ungemein zah reichen Cissus- und Caulotrethus-Arten kahl und blattlos (die Blatte und Zweige entwickeln sich ja erst hoch oben in den Baumkronen) vo Baum zu Baum, ringeln sich ein Stuck Wegs am Boden hin, oft sonde bar gedreht und korkzieherartig gewunden und verhängen als machtig Seile und Stricke des Wanderers Weg. Und doch ist der letztere oft froh ihnen zu begegnen, besonders wenn er recht mude und durstig ist; den sie enthalten eine Menge frischen, klaren Wassers, das wie ein Brunn lein hervorsprudelt, sobald der Stamm durchgehauen wird. Ein meter langes Stuck gibt über 1/2 Liter Wasser. Welche Wohlthat diese wunder bare Eigenschaft in den dortigen Wäldern ist, weiss nur der zu scha zen, der dort schon in tagelangen Waldsahrten und Jagdzugen, z. E hinter einem angeschossenen Elephanten her, seinen Schweiss vergosse hat. Diese Cissus-Stamme dienen bekanntlich als Unterlage fur die Rieser blumen der Schmarotzerfamilie der Rafflesien, deren Heimath gerad Sumatra und Java ist. Umsomehr glaube ich hervorheben zu müssen dass ich niemals in den von mir durchforschten Gegenden eine Rafflesi gefunden und auch Nichts über das Vorkommen derselben gehört habe Das nämliche Resultat erhielt ich bezuglich eines anderen Schmarotzen der so ungemein interessanten Familie der Ameisenpflanzen, der Myrme codien, deren der italienische Forscher Beccari so viele auf der West kuste gefunden hat. Und doch wüsste ich nicht, warum diese so merk wurdigen Gewachse nicht auch in Deli vorkommen sollten. Vielleicht is ein Anderer glücklicher als ich. Wo es etwas feuchtere Plätze im Wale gibt, da tritt eine andere frei rankende Liane in ihr Recht, namlich die bekannte Palmliane, der Rotan, Calamus (Palmae). Dieses elegant Gewachs bildet eine wahre Zierde der Walder, so lange man ihm nich zu nahe kommt. Anmuthig schlingen sich seine finger- bis daumendicker Ranken, die oft hunderte von Fuss lang und wohl spärlich, aber is ihrem ganzen Verlauf mit fein gefiederten Blättern besetzt sind, vor Busch zu Busch, von Baum zu Baum. Jetzt liegen seine elastischer Schlingen eine ganze Strecke weit am Boden, dort erheben sie sich fas ohne sichtbaren Anhaltspunct, da sie sich nur mit den dunnen, abe mit starken, gekrummten Dornenkranzen versehenen Blattauslaufern ringsum festhalten, hoch in die Lufte und ihre malerischen Wedel rager noch über die höchsten Baume hinaus, die sie mit ihren Ranken völlig durchweben.

Die Rotanpalme ist eine gesellig lebende Pflanze, so häufig und gemein, dass man ihr auf Schritt und Tritt begegnet, besonders in dem

niedrigen, sumpfigen Alluvialgebiet. Dort bildet sie ganze furchtbare und for Mensch und Thier undurchdringliche Dickichte, denn ihr Stamm, ihre Blatter und Zweige starren von fürchterlichen Stacheln, die keine Annaherung dulden. Wer sollte wohl so einen bösen, stacheligen Kameraden, mit dem kein Mensch im Walde gern zu thun hat, hinter dem schönen, glatten, nützlichen "Stuhlrohr" vermuthen! Denn dass der Rottan eine der nützlichsten Pflanzen ist, das ist ja weltbekannt, und es durfte selbst in Europa kaum ein Haus geben, wo er nicht in einer oder der andern Form in Gebrauch ware. Für den Malaien ist er geradezu Existenzbedingung: Nagel, Stricke, Draht, das Alles ersetzt ihm der Rottan; mit ihm bindet er seine Hauser nnd Gerathe zusammen, befestigt er die "Ataps" auf sein Dach, stellt Angeln fur Läden und Thuren her, aus ihm flicht er Körbe und Stühle, macht Schlingen für die Jagd und Saiten fur seine Musikinstrumente, näht auch im Nothfall seine zerrissenen Hosen damit zusammen; kurz der Gebrauch des Rottan ist tansendfach.

Die Malaien unterscheiden etwa 12 Arten, welche auch botanisch von einander verschieden sind; der feinste und gesuchteste ist der Rottan segah (Calamus heteroideus) etwa kleinfingerdick; der dickste, aber ebenfalls gesuchte, der daumendicke Rottan semambu (Daemonorops grandis? Griff.) aus dem die Spazierstöcke hergestellt werden. Ich habe semambu-Stöcke gesehen, die 4 Fuss lang nur aus einem einzigen Glied ohne Knoten bestanden. Solche Stöcke sind aber nicht häufig. Ihre schöne, goldbraune Farbe erhalten sie dadurch, dass die Malaien, nachdem sie dieselben ihrer Stachelhaut entkleidet haben, sie mit Oel anziehen lassen und dann über der Herdstätte räuchern.

Noch müssen wir eines andern nützlichen Rottan Erwähnung thun: des Daemonorops Draco oder Drachenblutrottan. Er gehört zu der gröbsten Sorte und liefert ebenfalls sehr gute Spazierstöcke, ausserdem sind seine nach Art der Weintrauben wachsenden Früchte mit einer trockenen, schwärzlichrothen, harzartigen Kruste überzogen, welche abgequetscht und pulverisirt einen rothen Farbstoff, das im Handel sogenannte Drachenblut, darstellt.

Den für Hauserbauten und Dachbedeckungen verwendeten Bindrottan macht man dadurch recht biegsam und geschmeidig, dass man ihn 8-14 Tage in Wasser einweicht oder ihn im Sumpf vergräbt.

Die Rottanproduction ist sehr bedeutend und ruht in den Händen der Malaien; früher wurde auch viel exportirt (im J. 1862 z. B. 2000 Busch), doch seit der grossartigen Entwicklung des Tabaksbaues genügt

der producirte Rottan kaum für den ungeheuren Bedarf der Pflanzen daselbst.

Neben und mit den Rottans an feuchten Stellen wächst eine stammlose Facherpalme, eine Licuala, mit riesigen Schirmblättern, deren Blattstiele beiderseits gelb gestreift und mit grossen Dornen besetzt sind (L. spinosa?). Ausserdem treffen wir von Palmen in diesen Wäldern noch einige andere kleine Licuala-Arten mit dunnem, 12-15 F. hohem Stamm, die gruppenweise beisammen stehen, eine Caryota (C. furfuracea?) deren Mark die Malaien zur Bereitung von Sago verwenden und einige schlanke Areca-Arten, worunter hauptsächlich die früher schon erwähnte Areca Nibung. Auch diese Palme gehört zu den viel gebrauchten, nützlichen Gewachsen. Ihr Stamm, der in den unteren Partien mit spitzen, langen Stacheln spärlich besetzt ist, wird bei Schenkeldicke 60 bis 80 Fuss hoch und mehr. Die aussere Schicht desselben ist in etwa Fingerdicke ausserordentlich hart und schwer, so dass kein Nagel einzutreiben ist und selbst ein Beil nur schwer eindringen kann, während der übrige Kern leicht und porös, schnell faulend ist. Ein gespaltener Stamm lasst sich desshalb leicht zu Dachrinnen und Röhren aushöhlen.

Vermöge dieser harten, widerstandssahigen aussern Schicht eignet sich derselbe gut als Pseiler sur den Hausbau, wozu er auch von den Malaien und Pstanzern allgemein verwendet wird. Ein solcher kann ohne zu saulen beinahe 10 Jahre aushalten. Die Latten, welche man ungemein leicht aus der ausseren Schicht herstellen kann, da dieselbe sich sehr leicht reissen lässt, werden in grosser Menge verbraucht zum Herstellen von Fussböden, Dachsparren, zum Anbinden der Ataps u. s. w. Das Holz ist sehr schön in die Länge gesasert mit schwarzen, weissen und braunen Streisen und macht polirt einen brillanten Effect.

Hiermit hatten wir den Hochwald und das was über unseren Köpfen sich befindet, abgethan und wollen nun der Flora zu unseren Füssen etwas mehr Aufmerksamkeit schenken. Zu diesem Zwecke müssen wir aber den jungen, niederen Wald aufsuchen, der den Sonnenstrahlen auch hie and da bis auf den Boden zu dringen gestattet, wodurch eine über alle Maassen dichte, reiche und saftige Vegetation hervorgerusen wird. Vornehmlich sind es die Scitamineen (Zingiberaceen), welche hier das grosse Wort führen. Ueber mannshoch ragen die schön beblätterten, saftigen Stengel der Gattung Elettaria empor, welche colonienweise so dicht beisammen stehen, dass man sich mit dem Hackmesser Lust schäffen muss. Ihre schönen, grossen, seurigrothen, seltener hochgelben Blumen, sitzen ohne Stengel direct auf der Erde (z. B. bei E. coccinea Bl.)

so dass es aussieht, als habe Jemand dieselben weggeworfen; anderntheils stehen sie auch wieder zu grossen Kolben vereinigt auf mehrere Fuss hohen Stengeln. Unter diesen imponirt besonders E. speciosa durch die Pracht und Schönheit ihres grossen rosenrothen Blüthenkolbens. Auch eine ungemein wohlriechende Art dieser Familie mit grossen, weissen Blothen habe ich beobachtet. An den schattigeren feuchten Stellen rechts und links von den sehmalen Pfaden findet sich eine goldgelb bluhende Globba mit eigenthumlich in die Lange gezogenen Blumchen 1). Dort breiten sich auch die verschiedenen Maranta- und Phrynium-Arten aus mit ihren lieblichen, mit farbigen Streifen und Zeichnungen versehenen Blattern, welche ja auch in Blumentöpfen als Zierpflanzen viel gehalten werden. Sie sind im Wald ungemein häufig und wachsen in unendlichen Colonien auf grössere Strecken hin gesellig zusammen. Dasselbe ist mit verschiedenen Musaceen der Fall; die jungen Blätter einer Pisang utan genannten Musa fallen auf durch tief saftbraune Spritzer und Flecken, mit denen die hellgrunen Blatter geziert sind.

Ab und zu gewahrt man auch eine Curculigo mit ihren schönen, einer jungen Kokospalme ahnlichen Blattern und erdständigen, gelben Blüthen. Doch liebt diese Pflanze schon mehr bergige Strecken und entwickelt sich besonders üppig an freien Hängen der Vorberge.

Von Erdorchideen trifft man an den Randern der zahlreichen fliessenden Wasseradern die schöne rothe Spathogiottis plicata Bl. und an vielen Stellen leuchten die blendendweissen, dicken, kolbigen Blumenstande einer Calanthe-Art, die auch eine dankbare, immerblühende Topfpflanze mit grossen, vollen Blattern abgibt. Verschiedene Aroideen breiten ebenfalls hier im Waldesdunkel ihre grossen, pfeilformigen, öfters hell gefleckten Blatter aus, und ich vermuthe, dass ein Fachmann leicht eine oder mehrere neue Arten darunter finden könnte.

Was Haufigkeit betrifft, so halten die Piperaceen den Scitamineen die Wage. Wo es einen Anhaltspunkt gibt, da ranken sich unzählige Arten von Pfeffergewächsen empor, denn, wir dürfen dies nicht vergessen, wir sind ja hier so recht eigentlich in dem Lande, wo "der Pfeffer wächst". Die meisten steigen nicht hoch, doch gibt es einige, welche bis in die bochsten Bäume hinaufklettern. Die Blätter zeichnen sich gewöhnlich durch schönes Colorit aus; die schönsten, welche ich gesehen habe, waren auf purpurbrauner oder dunkelgrüner Grundlage hellgraugrün geädert und etwa handgross. Zur Zeit meiner Anwesenheit im botanischen Gar-

¹⁾ Abgebildet in dem mehrfach citirten Werk der Midden-Sumatra-Expedition.

ten zu Buitenzorg, September 1887, hatte man einige solcher Ranken, ich weiss nicht mehr, woher, lebend erhalten; da sie aber noch nicht in Bluthe waren, konnten sie leider noch nicht bestimmt werden. Eine andere, kleinere Art mit gelbgrünen, regelmässig alternirenden Blättern legt sich so dicht an die glatte, weisse Rinde gewisser Stämme an, als ware sie mit Gummi festgeklebt, und es macht den Eindruck, als sähe man ein Blatt Papier aus dem Herbarium mit darauf befestigten, schön gepresster Pflanze vor sich. Der Sirih-utan (eine Chavica-Art) und der Kado-Kado (Chavica sphaerostachya Miq.) sind die gemeinsten Arten; die Blätter des letzteren werden mit Fischen zusammen gekocht und gegessen.

Schöne, uppige Farne (Polypodium) halten jedes freie Platzchen besetzt, dass die andern Pflanzen übrig lassen, und entwickeln sich oft zu bedeutender Hohe und Umfang. So entfaltet besonders gern eine Art im tiefen Waldesschatten auf dünnem 1-2 Fuss hohem Stämmchen riesige, mannslange und gegen 8 Fuss hohe Wedel. Einen netten Eindruck machen die zartgefiederten Selaginellen, welche sich durch alle Büsche 6 bis 10 Fuss hoch hinranken. Eine Art, die sich schirmartig nahe am Boden ausbreitet, glänzt in metallisch-blauem Schimmer, der jedoch nur unter gewissem Winkel auftritt und in der Nähe beinahe ganz verschwindet. Schliesslich müssen wir auch noch verschiedener kleiner Bäume und baumartiger Sträucher gedenken, welche hauptsächlich durch ihre schönen Blumen die Blicke auf sich ziehen und dem Auge in dem ewigen Grün eine angenehme Abwechslung bringen.

Darunter ist vornehmlich zu nennen eine Ixora (Rubiacee), welche zur Bluthezeit über und über mit ziegelrothen Blumenbüscheln bedeckt ist und eine Pavetta (Rubiaceae) mit schon weissen Blüthen, durch welche besonders gern die Schmetterlinge angezogen werden, sowie die rankende Uvaria coccinea (Anonaceae) mit grossen, lackrothen Blüthen.

In diesen Wäldern fortgehend sind wir so nach und nach aus der Gebirgsflanke theilweise auf schmalen oft nur fussbreiten Graten in etwa 2000 Fuss Höhe gelangt. Rechts und links von unserm Pfad stürzen tiefe finsterbewaldete Schluchten jäh ab — Erosionsthäler, denn diese Seite des Gebirges ist durch die ewigen Wassergüsse wild ausgenagt. Zum Glück bedeckt der ungeheuer üppige Pflanzenmantel diese oft schauerlichen Abstürze und fasst die schmalen, schwindligen Pfade mit undurchsichtigem Gebüsch ein, so dass man wähnen könnte, auf breiter Ebene zu wandeln. Biegt man aber das Gebüsch zur Seite, so schaut der entsetzte Blick hinunter auf die Gipfel hoher Bäume. Da grüsst uns aus

der Tiefe auch der herrliche Wedel eines Palmfarn, Alsophila sp., ein Beweiss, dass wir die Kustenvegetation verlassen und in diejenige der Berge eintreten. Die Grenze, wo dies stattfindet, liegt zwischen 1000-2000 Fuss; für die Abtheilung Deli kann man etwa eine Linie annehmen, welche sich vom Kampong Durian am Boaiaslusse (s. d. Karte in meinem Reiserapport, Tijdschr. v. Taal-, Land- en Volkenkunde, Dl. XXXI, 1886) parallel der Gebirgskette über die Tabaksunternehmung Betimus des Herrn Tabel am Deliflusse läuft: an diesen beiden Puncten habe ich die Grenze selbst constatirt; ja an letzterem Fluss kommt der Palmfarn sogar schon bei der Unternehmung Deli-tua vor. Die Pflanzen, welche uns beim Ueberschreiten dieser Grenze zunächst, und zwar in Masse, entgegentreten, sind ausser den vorgenannten Palmfarnen eine Palme, welche der Arengpalme sehr ähnlich sieht, doch ist ihr Stamm höher md schlanker, die Blätter sind etwas kleiner, feiner gefiedert und nicht so daster schwarzgrun gefärbt. Die Palme wächst, soweit das Land bergig ist, und kommt auch schon bei 1000 Fuss vor. Sie wird von den Batta's zur Bereitung von Palmwein und Zucker benützt und sogar der A. saccharifera vorgezogen. Wo der Boden etwas feuchter ist, wuchert überall massenhaft eine schon rosenrothe Balsamine (Impatiens sp.), während die trockenern Stellen von grossen Büschen der Chirita Horsfieldii (Gesneriaceae) mit schon violetten Bluthenkelchen besetzt sind.

Athmospharische Orchideen und Farrenkrauter werden haufiger, namentlich zieht unsere Blicke die früher schon erwähnte riesige Orchidee, Grammatophyllum, auf sich. Kommen wir noch 2000 Fuss weiter hinauf, so befinden wir uns schon in einer subalpinen Region, nämlich auf dem nordlichen Plateau von Tobah, das in ungefähr 4000 F. Meereshöhe liegt. Die Morgen- und Abendluft ist hier schon sehr merklich kühler und macht oft ein wärmendes Feuer recht wünschenswerth. Kokos- und Pinang-Palme sowie der Pisang gedeihen nur noch an recht geschützten Stellen, z. B. im Becken des Tobahsees, Betelpfeffer (Chavica Betle) nicht mehr.

Das nördliche Plateau von Tobah ist eine schwach gewellte, viele Stunden lange und breite Fläche, durchzogen von tiefen, steil abfallenden Schluchten und Spalten, die auf ihrem söhligen Grunde gewöhnlich ein fliessendes Wasserlein beherbergen. Jah und unvermittelt ragen einige isolirte Berge aus dieser Hochebene empor, wie z. B. der Dolok Singalang, Dolok Dändu binoa, Dolok Simanabum (der schon erwähnte, noch thätige Vulcan) etc., welche 2-3000 Fuss über das Plateau erhaben sind. Am südlichen Ende liegt der grosse Tobahsee in einem über 1000 Fuss tiefen, jäh abfallenden Becken.

Die dominirende Pflanze der Hochebene ist selbverstandlich der Lalang, batta'sch: re. Die ganze Hochebene, soweit das Auge reicht, bildet eine einzige, grosse, grune Lalangfläche, hie und da auch auf grössere Strecken hin abwechselnd mit einem harten, stacheligen Farnkrautgewirre. Selbstverständlich können in dieser grünen Wüstenei nur wenige andere Pflanzen ein kummerliches Dasein fristen. Zu diesen gehören besonders häufige, mannshohe Busche von zwei Melastomaceen, Osbeckia linearis und Melast. decemfidum, die gewöhnlich über und über mit lilarothen, grossen Bluthen bedeckt sind. Ausserdem habe ich auf meiner Reise (1883) auch bei dem Kampong Sibaribuan eine Colonie von Berberis nepalensis, batta'sch: Patjora, beobachtet. An vielen Orten ist der Lalangrasen durch grosse, weidende Viehherden (Rinder und Pferde) abgefressen und kurzgehalten, da die jungen Lalangspitzen ein beliebtes Viehfutter sind, und dort haben auch kleine Pflanzchen Gelegenheit, sich zu entwickeln. Sie bilden dann oft ganze Blumenteppiche. Darunter gehören ein liebliches, sehr wohlriechendes Veilchen, Viola trinervis, batt. atsi-atsi, und eine Scrophularinee, Striga hirsuta Benth., mit schon violenblauen Bluthen, welche, mit einigen andern Pflanzen zusammen zerquetscht, von den Batta's als ein sehr wirksamer Gegenmittel gegen Vergiftung genossen wird. Auch ein liebliches, purpurrothes Haideröslein lasst sich ziemlich häufig sehen, sowie eine Leguminose (Cassia pumila Lam.), zwei goldgelbe Ornithogalum-Arten und mehrere, winzig kleine Erdorchideen.

Wo der Lalangrasen einmal zu Reis, Mais oder Bataten-Feldern umgebrochen war, entwickelt sich nach dem Abernten eine niedrige Brachfeldvegetation, worin besonders kriechende Papilionaceen (Bohnen), Polygala rufa Span., batt. paneh paneh letto genannt, Solanum nigrum und eine gewurzhast riechende Artemisia sp. (A. indica?) vorherrschen. Wie man sieht, haben diese Brachfelder keinen tropischen Character mehr. Noch mehr fallt dies auf, wenn wir nun in eine der zahlreichen oft 100 und mehr Fuss tiesen Erosionsspalten auf steilen Pfaden hinabsteigen. Da finden wir unten auf dem söhligen, feuchten Boden etwas, was zwischen den Wendekreisen so selten zu sehen ist, und dem tropenmuden Auge eine wahre Erquickung gewährt, nämlich eine richtige Wiese, geschmückt mit Blumen, welche fast durchweg europäischen Gattungen angehören. Es ist gerade, als wenn sich die rechtmässige und ursprungliche, tropisch-alpine Flora der Hochebene vor dem Alles erstickenden Lalanggrase und seinen Trabanten gestüchtet und hier unten zusammengedrängt hatte. Ausser der früher erwähnten, rothen Balsamine sehen wir

da Ranunkeln (R. diffusus DC., batt. Si-porkas), Clematis (Cl. Leschemaltiana DC.), Veilchen (V. trinervis Korth. und arcuata Bl.), ein prachtvoll tiefblaues Vergissmeinnicht (Cynoglossum javanicum) und ein wohlnechendes Geissblatt (Lonicera Leschenaultii Wall., batt. Antarharang).
Um den heimatlichen Eindruck zu vervollständigen, präsentirt sich auch
noch ein hochgelbes Kräutlein Rührmichnichtan (Impatiens Diepenhorsti Miq.); wir könnten beinahe vermuthen, uns etwa in einem Thälchen Süddeutschlands zu befinden, wenn nicht aus einem benachbarten
Kampong einige spärliche Pisangstauden und die von dem Batta unzertrennliche Arenga saccharifera hervorlugten und uns daran mahnten,
dass wir uns auf einer Hochebene Centralsumatra's befinden und mit
eigenen Augen das Wunder schauen durfen, wie heimathliche und tropische Formen sich hier vermischen und wie neben dem Pisang das
Veilchen, neben der Zuckerpalme das Vergissmeinnicht gedeiht.

Ausser den vorgenannten, waren von blumentragenden Pflanzen noch zu bemerken eine Burmanniacee (B. sumatrana Miq.) und eine Xyridee (Xyris melanocephala Miq.), sowie an recht feuchten, schattigen Stellen Lysimachia debilis Wall,

Palmfarne, namentlich grössere, sind in diesen Schluchten eine ziemlich seltene Erscheinung, weil sie der Batta ihres nützlichen Holzes wegen fallt, das er mit Vorliebe zu Zäunen, Gartenthürpfosten u. s. w. verwendet: ich habe dies namentlich im Kampong Tinging am Tobahsee bemerkt. Dortselbst auf einer Anhöhe sah ich auch eine Kolonie merkwürdiger, kleiner, nur bis zu zwei Fuss hoher Zwergpalmfarne mit deutlichem, verhaltnissmässig dickem Stamm und schöner Blattrosette.

An den steil aufsteigenden Wänden dieser Schluchten fand sich zu unterst zwischen Gebüsch, worin der Strauch Salagundi (Vitex trifoliata) auffiel, dessen intensiv bittere Blätter und Blüthen auch von den Batta's gegen Fieber genossen werden, der ganze Boden öfters von einer rankenden Schmarotzerorchidee mit unscheinbaren, grünen Blüthchen dicht überfilzt. Dazwischen wucherten Knötericharten (Polygonum chinense L. und P. barbatum L., batt. Siok sio Krangan) und hie und da ein Strauch von Nepenthes eustachya Miq., dessen kaum spannenlange, grüne Krüge durchgängig mit klarem Wässer gefüllt waren, worin massenweise todte Ameisen umherschwammen. Es fiel mir auf, dass dieselben stets zu ein und derselben Art gehörten; nie fand sich ein Exemplar einer andern Species darunter; auch war es räthselhaft, wie oft drei und vier Dutzend Thiere in dem wenigen Wässer eines einzigen Kruges ersaufen konnten, da es doch für sie, namentlich für die zuletzt hineingefallenen, ein Leich-

tes gewesen sein muss, an den keineswegs glatten Wanden der Behalter emporzulaufen. Es war dies jedoch vielleicht eine Art, welche im Klettern wenig geubt war und desshalb allein umkam, wahrend ihre Schwestern, vermöge ihrer grösseren Fahigkeit zu klettern, sich retten konnten.

Höher hinauf an dem zahlreichen Abstürzen und Schutthalden fand sich die schöne, roth und weiss blühende Orchidee, Arundina bambu saefolia und ein schön hellgelbes Gnaphalium mit silberweissen Blättern und dem ausgezeichneten Duft unserer einheimischen Immortelle. Es war eine ganz neue Art, Gnaphalium Hageni, wie man sie im botani schen Garten zu Buitenzorg benannt hat.

An den glatten Felswänden einer Schlucht bei Tingging, durch welche sich ein reissender Bach seinen Weg gebahnt hatte, wucherte ein krie chendes Rhododendron, batt. Kala beriama, mit ziemlich grosser isabell farbener Blüthe und rosenrothen Staubfaden. Das einzige Exemplar welches mir zu erreichen gelang, habe ich an das botanische Institut nach Munchen gesandt, aber leider seitdem Nichts mehr darüber ge hort, so dass ich über Gattung und Art nichts Bestimmtes mittheilen kann. Auch eine Prunus-Art prangte dort im vollen weissen Bluthenschmuck wie unserer heimischer Schlehdorn und die minder steilen Hange waren bedeckt von einer violetblühenden, unserm Luzernerklee gleichenden Papilionacee. Ueber die Felswande hingen in malerischen Guirlanden Lianenstränge mit dicken, ledernen und weit über handgrossen Blättern herab, die in grun und purpurner Zeichnung prangten. Diese Blatter - Bluthen habe ich nicht gesehen - schienen Hoya-Arten anzugehören. Auch ein, unsrer europäischen Besenpfrieme (Spartium scoparium), sehr ahnlicher Strauch fand sich, und die oben schon erwähnte Rubus-Art mit rothen, aber völlig geschmacklosen Himbeerfruchten wucherte auch hier in grosser Menge, dornige dichtverschlungene Hecken bildend.

Dies ist ungesahr das Vegetationsbild der nördlichen Hochebene von Tobah, wie es mir, soweit der Mensch noch nicht verändernd eingegriffen hat, auf meinen beiden Reisen (1881 und 1883) fluchtig sestzustellen gelang. Ueber die Flora der Bergwälder, welche die Gipsel der Randgebirge und der isolirten Trachytkegel bedecken, kann ich leider nicht viel mittheilen, da ich nur einen Gipsel, den Dolok Dandu binoabestiegen habe. Derselbe ragt 2000 Fuss über die Hochebene empor, und ist sast ganz mit der gewöhnlichen Lalangvegetation bedeckt; nur ganz oben sindet sich ein zerrissener Waldmantel. Im Schutze desselben wucherte in grosser Menge eine Begonium-Species, mit handgrossen, gelappten Blättern und rosenrothen Blüthen; dies gabe sicherlich eine präch-

nge Topfzierpflanze ab. Auch eine schöne Aroideenbluthe fand sich, purpurbraun mit hellen Streisen, Arisaema filisorme B. Eine grossblätterige, ungemein dornige Rottanranke von einer Art, welche, meines Wissens und nach Aussage der Batta's im Kustengebiet nicht vorkommt, also wahrscheinlich der Hochebene eigenthumlich ist, versperrte mir öfters den Weg. Der Standort, in fast 6000 Fuss Meereshöhe, dürste einigermassen merkwurdig sein. Von Sträuchern war Lasiolepis Bennetti Bl., batt. Tuba und Elaeagnus ferruginea Ruh., var. Sumatrana, batt. Kail-Kail za bemerken, von welchen ich später noch sprechen will. Von Bäumen wurde mir das Kaju inggul (Cedrella febrifuga) genannt, ein sehr gutes Banholz, dessen Anbau, da es ziemlich schnell wächst, von den Pflanzm auch in den Vorbergen Deli's mit Erfolg versucht wurde. Vergebens aber fragte ich nach dem Kaju tussam, welches auf den Bergen südlich vom Tobahsee angetroffen wird; nur einige weitgereiste Batta's kannten dasselbe vom Hörensagen und versicherten mir aufs Bestimmteste, dass dasselbe nördlich vom See nicht mehr vorkomme.

Beinahe jeder Kampong auf dem Plateau ist umzaunt und mit einem kleinen Waldchen umgeben, dessen Bestand sehr geschont wird, und bier, in der Nahe des Menschen, finden wir einige Pflanzen, die wir anderswo vergebens suchen würden. Der Zaun besteht gewöhnlich aus einer lebendigen, undurchsichtigen und undurchdringlichen, haushohen Hecke von Bulu duri. Um ihn herum zieht sich gewöhnlich noch tine niedrige Hecke von Ranken des Rubus sumatranus, Miq., dessen Bluthen und Früchte fast genau denen unserer wohlbekannten Walderdbeere gleichen, nur ist der Geschmack weniger aromatisch. Ich habe mir auf meinen Reisen händevoll dieser herrlichen, so sehr an die Heimath erinnernden Fruchte schmecken lassen. An den Hecken beim Kampong Purba sah ich eine Varietät mit nur goldgelben Beeren. Andere hanfige Straucher sind Pavetta acuminata Korth., batt. Djarum-djarum, mit schonen, weissen Dolden und Elaeagnus ferruginea Rich., var. Sumatrana, mit oben graugrunen, unter kaffeebraunen Blattern, welcher ungemein lieblich nach Gewürznelken riecht und Lasiolepis Bennettii Bl. (Simarubeae). Es ist dies ein hartholziger, dorniger Strauch, im Wuchs ctwa unserm Schlehdorn vergleichbar. Die Blüthen sind unscheinbar, klein, grunlich, dicht am Stengel sitzend und produciren kleine, grune, violett angehauchte Früchte von der Grösse eines starken Stecknadelkopfes, welche aber einen so furchtbar scharf aromatischen Geschmack haben, dass es mir den Athem versetzte und ich beinahe eine Viertelstunde lang wie betäubt war, als ich ihrer sechs auf einmal im Munde zerkaute.

Die Batta's, deren Geschmakspapillen durch das ewige Sirikauen entarte sind, rühmen diese, *Tuba* genannten, Früchtchen sehr als Stimulan und durststillendes Mittel auf Reisen.

Zwischen diesen Buschen rankt sich hie und da Lonicera Leschenaultü sowie eine Rubia-Species, Rubia cordifolia Lan., var. javanica, batt. Si rabrabegung, welche dieselbe Eigenschaft besitzt, wie unser heimische Galium Aparine, nämlich an den Kleidern festhaften zu bleiben und wird desshalb von den batta'schen Gassenbuben ebenfalls zum muthwil ligen heimlichen Bewerfen benützt wie von unsern weissen Sprösslinger zu Hause. Auch eine Stellaria, batt. Serampas bideh und eine Caryophylle (Drymaria cordata Willd.), sowie eine winzige Composite, eine wahre Miniaturausgabe unsres heimischen Bellis perennis, waren zu bemerker und an einer Stelle des Dorfgrabens bei Tingging grunte eine Umbelli fere, der einzige Vertreter dieser bei uns so zahlreichen Pflanzensamilie, den ich in Sumatra zu Gesicht bekam. Eine Urticacee (Oreocnide sylva tica Miq.) ist häufig zu bemerken, aber auch eine furchtbare halbmanns hohe Brennnessel, deren fürchterliche Stiche man sogar durch die Hosen hindurch fuhlt. Die sonst so übel aussehenden Sawahsumpfe gewähren zur Zeit der Brache einen sehr lieblichen Anblick, sie sind dann namlich von einem hellgrunen Sumpfpflänzchen, Monochoria vaginalis Pr., mit hellvioletten Blumen und dicken fleischigen, von den Batta's unter dem Namen Li-Korbuk als Gemüse gegessenen, Blättern überzogen werden, so dass sie zu die dieser Zeit ganz den Eindruck blühender Veilchenbeete machen.

Ist später der Reis abgeernet und sind die Sawahselder ausgetrocknet, so wuchern zwischen den Stoppeln Compositen (Youngia fastigiata DC., var. runcinata, Lactuca-Arten, etc.), niedere Papilionaceen und Labiaten (Coleus scutellarioides, var. β., batt. Si-Kressing; Scutellaria Horssieldiana Miq., batt. Pahite; Gomphostemma parvissorum Wall., batt. Latikrangan) in vielgestaltiger Menge, welche zum Theil dem Batta gesuchte Gemüse liesern. Namentlich liebt er eine weissblühende Kresse, welche sich an den seuchten Bach- und Grabenrändern in der Umgebung von Tingging sehr häusig sindet. Dass auch überall Farrenkräuter nicht sehlten, brauche ich wohl kaum zu bemerken; insbesondere waren die Ränder der Dacher im Kampong Nagasaribu mit den eleganten Blättern verschiedener Davallia-Arten (D. pedata Sw. und solida Sw.) ringsum besetzt.

In den Wäldchen ringsum die Kampongs, welche den dreisachen Zweck haben, das Dorf beinahe unsichtbar zu verstecken, es vor den rauhen Winden der Hochebene zu schützen und genügendes Brennholz

m liefern (ich musste mir letzteres der Seltenheit wegen auf meinen Reisen tiers kaufen) und welche desshalb, wie oben gesagt, sorgfaltig geschont serden, treffen wir ebenfalls verschiedene Baume und Straucher, die vir sonst vergebens suchen wurden. Da finden wir einige Akazien (Papilionaceen), Ternströmiaceen (Saurauja gigantea DC.), Araliaceen (Macopanax glomerulatum Miq., deren lichtgrune Blumenkugeln recht angenehm riechen, batt. tibang-tibang), Loganiaceen (Fagraea litoralis Bl.), sovie den dornigen Dataphaum, Erythrina sp. (indica?) der, mit leuchtenden, brennendrothen Blüthentrauben überschüttet, dem Auge eine angenehme Unterbrechung der einförmigen braunen und grünen Tinten gewährt. Auf dem Boden wachsen Acanthaceen (Ebermayera spiciflora Mig)., Liliaceen (Disporum multiflorum Don.), Tradescantien und Papilosaceen, von denen eine Art Desmodium strangulatum parvulum, welche gen am Rand der Wälder und Gebüsche wuchert, prächtige feuersarbene Mathenahren hat und sich als Zierpflanze nicht schlecht ausnehmen wirde. Dazwischen ranken sich Ipomeen und eine Zaunrübe (Bryonia scabrata Bl.). Auch die früher schon erwähnte Chirita Horsfieldis R. Br. w. β, scaberrima Cl., batt. Bodi-bodi, breitet ihre schönen, violetten Bluthentelche hier aus und Ch. polyneura Miq., var. albiflora, deren Bluthenkelche weiss und nur am Rande schmal violett eingefasst sind, eine Pflanze, die wurdig ware, in jedem Garten zu prangen. Den weitaus gosten Bestandtheil dieser Walder jedoch bildet die Zuckerpalme, Arenga saccharifera. Ihr dusteres, ernstes Grun harmonirt sehr gut mit den alten, verraucherten, braunen Hausern und ihren riesigen, schwarzen Dachern, welche dem Battadorse einen finstern, drohenden Character releihen, wie denn überhaupt die Hochebene im allgemeinen einen mageren, tristen Eindruck macht. Ich glaube, wir dürsen getrost annehmen, dass hier in diesen Bergen und auf dem Plateau die eigentliche Heimath der Zuckerpalme ist, und dass sie erst von hier, ihrem ursprünglichen Vaterland aus, in die Küstenebene nach Deli vordrang, obwohl sie jetzt dort so haufig ist, wie der Sand am Meer, doch nur auf einstigem, wenn auch hundertjährigem Culturland; im jungfräulichen Urwald, was der Malaie rimba tua nennt, fehlt sie, und dies ist ein Beweis für die Richtigkeit unserer Vermuthung.

Ohne die Zuckerpalme könnte der Batta kaum bestehen; sie liesert ihm von ihren kohlschwarzen, langen, steisen, pserdehaarartigen Blattscheidesasern, Idjuk, Hidjuk oder Idjup genannt, welche in grosser Menge den Stamm einhullen, so dass er dadurch schwarz aussieht, dauerhaste Stricke und die sast ausschliesslich gebrauchliche Dachbedeckung, in

ihren getrockneten Blättern eine wircksame Umzäunung für Haus un Dorf, in ihrem Saft ein brillantes Getränk und sehr guten Zucker un in der unter den abgestorbenen Blattscheiden und der Wurzelrinde b findlichen Wolle einen famosen Zunder. Schliesslich noch versteht de Batta-Virtuose aus den geschabten Wurzelfasern und theilweise aus de Blattscheidefasern wohlklingende Saiten für seine Mandoline (Kutjapi) un der Schreiber aus den stärksten dieser Fasern seine Federn herzustelle

Das ist doch gewiss eine vielseitige Verwendbarkeit und der Nam dieser unschönen Palme darf sich getrost neben dem der nützlichste Gewächse blicken lassen.

Leider sind die Orchideen, welche ich auf meinen beiden Reisen at dem Plateau von Tabah sammelte, in Buitenzorg noch nicht bestimm worden, und muss ich mich desshalb auf einige allgemeine Angaben b schränken. Von Erdorchideen habe ich meines Wissens ein halbes Du zend Arten gesammelt, unter denen besonders eine in den feuchte Waldern bei Hutawaja durch lange, dickbesetzte, gelblichweisse Bluthe ahren sich auszeichnete, welche aber einen sehr unangenehmen Geruc verbreitete; eine andere gehörte der Gattung Calanthe an, war aber leid nicht in Bluthe. Die atmosphärischen Orchideen, etwa 12 an der Zah gehören fast durchweg kleinen, unscheinbaren Arten an, fanden sich ab in allen Wäldern sehr reichlich.

So hätten wir denn nun nach und nach die verschiedenen Vegetation formen der Kustenebene von Deli und des angrenzenden Plateau's vo Tobah flüchtig durchwandert und wie ich hoffe einen allgemeinen, oriet tirenden Ueberblick über die Flora dieser Gegenden gewonnen. Möchte nun bald Botaniker von Fach sich bemüssigt finden, die Sache in de Hand zu nehmen und uns in kurzer Frist mit einer ausführlichen "Flora Deliana" zu beschenken!

DIE THIERWELT.

Die vorangehenden Capitel haben, wie ich hoffe, dem geehrten Lese einen fluchtigen Ueberblick gegeben über das Land, sein Klima un seine Pflanzendecke, mit einem Wort, über die Bühne, worauf sich da so unendlich reiche, animalische Leben abspielt, und ich will nun i Folgendem die Fauna, so weit ich sie habe kennen lernen — und ich bin neun Jahre lang fast alltäglich mit Flinte und Insectennetz in de

Waldern herrumgelausen — einer etwas eingehenderen und aussührlicheren Betrachtung unterwersen.

Jedermann sind die scharfsinnigen Schlusse bekannt, welche der berühmte, englische Forscher Wallace aus der geographischen Verbreitung der Thiere auf den malaiischen Inseln folgerte. Nicht blos, dass er mit sicherer Hand durch diesen Archipel die Grenzlinie zog, wo sich die Famen Indiens und Australiens berühren, hat er auch durch Vergleichung der einzelnen Inselfaunen mit grosser Wahrscheinlichkeit die Entstehungsgeschichte des malaiischen Archipels zu enträthseln gesucht und u. A. gefunden, dass Sumatra in einer verhältnissmässig sehr jungen Zeitperiode, nachdem Java schon isolirt war, temporär mit Borneo und Malakka zusammenhing. Er that das zu einer Zeit, wo die Thierwelt, namentlich die der Saugethiere der grossen Sundainseln, noch sehr wenig bekannt und erforscht war, so dass seine Hypothesen, so geistreich und überraschend sie auch sind, auf ziemlich schwachen Füssen standen und durch neue Entdeckungen ebensogut befestigt als umgestossen werden konnten.

So hat z. B. der Director des Leidener Museums, Dr. Jentink, schon 1881 1) durch eine sehr genaue Aufzahlung der Säugethiere von Java, Borneo und Sumatra, gezeigt, dass die Verbreitung derselben, soweit ihre Kenntniss seit Wallace vorgeschritten war, ebensogut für als gegen dessen Behauptungen sprechen konnte.

Meine Entdeckungen auf Sumatra nun, welche ich nachfolgend besprechen will, haben heute, 1889, den Standpunkt wiederum verändert und wie ich hoffe die Lösung um einen Theil näher gerückt. Und ein Reisender, der in der Lage wäre, ein oder mehrere Jahre an günstigen Lokalitäten auf Borneo zu verweilen, wurde wahrscheinlich noch weitere, ganz ungeahnte Thatsachen für die Zoogeographie zu Tage fördern.

Wir stehen eben immer noch im Zeitalter des Sammelns und mussen uns vorderhand noch zunächst darauf beschränken, eine tüchtige Basis für spätere Forscher zu schaffen. Lokalforschungen, auf einen für die Kraft eines einzigen Mannes ausreichenden Platz beschränkt, aber dort mit unablässigem Eifer jahrelang fortgesetzt, können allein ein vertrauenswürdiges Material liefern, um aus solchen Hypothesen wissenschaftlich bewiesene Thatsachen zu machen.

Das Nachfolgende macht nun auf weiter Nichts Anspruch, als ein

¹⁾ in "Aardrijkskundig Weekblad" etc. vom 18 Aug. 1881. Leider hat er die dort sagekündigte Specialarbeit über diese Frage bis heute noch nicht publicirt.

solcher Material-Beitrag zu sein. Die Liste der Thiere, welche ich at einem Theil der Ostkuste Sumatra's und dem nördlichen Plateau vo Tobah, bisher jungfräuliche Länder, gesammelt habe, soll hier der Forscher in toto zugänglich gemacht werden. Wer sich je einmal mit de Zusammenstellung von Lokalfaunen im Gebiet des malaiischen Archipe befasst hat, wird erfahren haben, einen wie unendlichen Zeitaufwan und welche fast nicht zu bewältigende Arbeit das Zusammensuchen at einer Unzahl von grossen und kleinen, oft sehr verborgenen, Publicationen macht 1) und wird mir Dank wissen, dass ich ihm die Resultat meiner Sammlungen hier zusammengefasst mittheile. Leider kann ic nicht Alles besprechen, was ich zusammengebracht habe, da mir ausse Anderem die systematischen Listen über die meisten Insectenabtheilungen mit Ausnahme von Lepidopteren und Coleopteren, noch nicht zugegange sind; dieselben können später, vielleicht in einem Nachtrag, gebracht werder

Dass ich zugleich Veranlassung genommen habe, bei vielen Thiere meine Erfahrungen über Lebensweise, Betragen im freien und gefangene Zustand etc. beizufügen, wird, wie ich hoffe, ebenfalls nicht unwillkom men sein und nicht blos dem Jäger und Naturfreund, sondern auch der zunftigen Zoologen vielleicht einiges Interessante bieten.

Es sei mir nun gestattet, kurz auf einige wichtige Thatsachen hinzu weisen, welche, wie ich glaube, aus den nachfolgenden Listen hervorgehen

Da ist nun zunächst zu erwähnen, dass der Satz Wallace's bezuglich der grossen Uebereinstimmung der Faunen von Borneo, Sumatra unt Malakka in ungeahntem Grade bestätigt wird.

Ich habe, um zunächst von Säugethieren zu sprechen, auf der Ostküste vierundsechzig Species gefunden, darunter, mit Ausnahme von zwei ganneuen Flugeichhörnchen (*Sciuropterus hageni* Jent. und *Sc. platyurus* Jent.) sechs Arten, die bislang nur von (Malakka zum Theil und) Borneo be kannt waren, meist als für letztere Insel characteristisch angesehen wur den. Diese sechs Thiere sind:

Arctogale stigmatica, Hemigalea derbyana, Herpestes brachyurus, Cyno gale bennettii, Ptilocercus lowii und Rhisomys dekan. 2)

¹⁾ Wie schwer die Zusammenstellung einer malaiischen Fauna ist, mag man stüder Besprechung eines Artikels von R. Schuiling: "De grenslijn van Wallace eene con tinentale grens" durch Dr. Jentink entnehmen (In "Tijdschrift van het Kon. Nederl Aardrijkskundig Genootschap. Meer uitgebreide artikelen, 1889").

²⁾ Cf. den Artikel von Dr. Jentink in: "Notes from the Leyden Museum, Vol. XI p. 19", und von mir "Vorläufige Mittheilungen über die Fauna Ost-Sumatra's" im "Aufland", 1881, p. 558.

Asserdem fand ich noch zwei Varietäten von Saugethieren, deren Harkleid merkwürdigerweise genau mit dem einiger Varietäten von Bomeo übereinstimmt, so dass also beide Lokalitäten nicht blos Gattungen und Arten, sondern sogar characterische Varietäten mit einander gemeinsam haben. Dieselben betreffen die Spielart von Sciurus prevostii und Tupaja ferruginea, var. chrysura Jent. (s. dort).

Die Saugethierfauna von Sumatra hat also demnach eine bedeutende Bereicherung erfahren und zwar mit Formen, welche man, wie gesagt, bisher als ausschliesslich Malakka und Borneo angehörig betrachtete. Dadurch haben sich, wie es scheint, die Verhältnisse wesentlich zu Gunsten der Wallace'schen Hypothese verschoben, und es ist wohl der Muhe werth, nunmehr das Verhältniss der Saugethiere der einzelnen Inseln zu einander auf Grund der neuen Entdeckungen zu betrachten. Ich folge hiebei den Aufstellungen Dr. Jentink's, wie er sie in seinen mehrfach ewahnten Aufsatzen und zuletzt noch brieflich mir gegeben hat.

An Saugethieren sind zur Stunde bekannt von

Sumatra 112 Arten

Borneo 93 ,

Java 97 ,

Rechnen wir nun die Fledermause, welche von allen Inseln wohl am wenigsten bekannt sind und durch ihre leichtere Verbreitungsfähigkeit das Bild nur verwischen würden, ab, so haben gemeinsam:

Sumatra und Borneo 45

Sumatra und Java 30

Borneo und Java 23 Arten.

Sumatra und Borneo haben also beinahe doppelt so viele Saugethiere gemeinsam, als Borneo und Java!

Bezuglich der Avifauna ist Sumatra, wie schon Wallace bemerkt, kamm von Borneo zu unterscheiden. Ich habe auf der Ostküste ein hundent zwei und achtzig Arten von Vögeln gefunden; darunter waren sechzehn für Sumatra neu, aber bekannt von Malakka, Borneo und Java. Besonders merkwürdig war mir das Vorkommen eines Thieres, welches Wallace als für die Insel Banka characteristisch angibt 1), das aber, wie mir Herr Buttikofer schreibt, auch in Indien gefunden ward, namlich Pitta megarhyncha; ich habe dasselbe lokal in Siak gefunden. Herr But-

¹⁾ Wallace, Verbreitung der Thiere, Uebersetzt von A. B. Meyer, 1876, p. 416, I Bd.

thoter der bekannte Ormitolog des Leydener Museums, welcher sie der filte interzog, meine Vogeihabre und Zeichnungen zu bestimmer ties von mir sehen geschehen war, zu verificiren, war fraj part der die grosse Uebereinstimmung meiner Sammlungen mit der mit datum den Ormis, und namentuch über die Differenz mit solchen vo der Meiste Sumatra's: Es besinden sich nur wenige der für di Meister daracteristischen Arten darunter.

Unter den vierundvierzig Schlangen, weiche nur eine einzige, wahr scheinlich neue Giftschlange ergaben. Societys Hageni s. dort), fand sie etenfalls ein Anklang an Borneo, indem die von mir beobachteten Exen plate von Ophiophagus elaps die gleiche Farbung trugen, wie die Exen plate von Borneo.

And die Schmetterlingsfauna ist ausserordentlich übereinstimmend in eine nur an die schöne Ormingtera brookeans und an eine Vi Englises milamus, die Englises multiker, welche Herr Distant in die einestant bornean race or form of E. milamus and peculiar that that halt.

and fanden sich sowohl unter Tag- als unter Nachtfaltern, vo unter 315 Species etwa sechs, von den letzteren unter 18 moviel. Besonders bemerkenswerth ist ein neuer *Papilio*, de Propose angehörig, den Herr Rogenhofer beschrieben hat 3).

Maben diese Betrachtungen uns nun gezeigt, dass die Thierwelt von Manatra in viel höherem Grade mit einander übereinstimmt wie man hisher vermuthen konnte, so geht aber daraus zugleich noch anderes hervor, nämlich dass die Ostkuste Sumatra's faunistisch der Westkuste geschieden ist. Die ganze Saugethierfauna de Ostkuste ist, wie Herr Jentink sich ausdrückt, mit ein oder zwei unbe deutenden Ausnahmen, identisch mit der von Borneo; von den für di Westkuste Sumatra's eigenthümlichen Arten kommen nur wenige auf de Ostkuste vor und umgekehrt wurde nicht eine einzige der oben ange führten, auf der Ostkuste gefundenen Arten, wie Ptilocercus, Cynogale Memigalea u. s. w. auf der Westkuste gefunden, obwohl dort doch ein ganze Reihe von Sammlern und Forschern thätig war, von denen ich

¹⁾ CL Buttikofer. Contribution to the ornithology of Sumatra. Notes from the Ley den Museum, Vol. IX.

²⁾ Distant. Rhopalocera malayana, p. 26.

²⁾ A. F. Rogenhofer. Papilio Hageni, eine neue Art aus Sumatra, in: Verhand 4. K. K. zoologisch-botan. Gesellschaft in Wien, 1889

beispielshalber nur Raffles, S. Muller, Junghuhn, v. Rosenberg, Beccari und die Forscher der "Midden-Sumatra"-Expedition nennen will.

Auch in Bezug auf die Vogelwelt ist der Unterschied, wie ich oben schon hervorgehoben habe, frappant, und ebenso bei den Insecten. Die Grenzlinie der beiden Faunen fallt zusammen mit der geologischen; soweit die Alluvialebenen der Ostkuste 1) reichen, haben wir auch sozusagen eine Alluvialfauna, combinirt aus denen von Borneo und Malakka mit der westsumatranischen.

Und so wie wir die trennende Gebirgsmauer überschritten haben, befinden wir uns sofort beinahe in einer ganz andern Welt. Dies überraschte mich ganz besonders auf meinen beiden Reisen nach dem Innern der Battalander, nach der nördlichen Hochebene von Tobah. Kaum hatte ich den letzten Gebirgspass überschritten und den Fuss auf das Plateau gesetzt, so umgaben mich auf Schritt und Tritt Thiere, die auf der ganzen Westküste verbreitet und theilweise gemein sind, auf der Ostüste dagegen vollkommen fehlen. Von Saugethieren war dies besonders: Paradoxurus leucomystax, von Vögeln: Dendrocitta occipitalis, Buchanga stigmatops, Sphenocercus oxyurus, Niltava grandis, und von Schmetterlingen: Acraea vesta, Cathaemia belisama, Vanessa cardui, Argnais niphe, Debis rohria und eine ganze Reihe weiterer.

Es ist ja nun ganz natürlich, dass diese Verschiedenheit der Thierwelt in erster Linie auf Rechnung des verschiedenen Höhenklima's zu setzen ist. Dadurch ist aber doch die ganz merkwürdige Verbreitung namentlich der Saugethiere nicht genügend erklärt; man hat den Eindruck, als sei die ganze Fauna der alluvialen Küstenebene ebenfalls eine alluviale, von den gegenüberliegenden Küsten Malakka's und Borneo's angeschwemmte, die noch nicht Zeit gehabt hat, sich über die ganze Insel, namentlich die alteren Parthieen, auszubreiten. Das würde namentlich dann mit grosser Wahrscheinlichkeit behauptet werden können, wenn wir Naheres über die Vertheilung der Fauna Borneo's oder Malakka's über die verschiedenen Höhenzonen wüssten, insbesondere wenn sich herausstellen sollte, dass die Saugethiere, welche in Sumatra ausschliesslich in der Küstenebene vorkommen, auf Borneo und Malakka Höhen bewohnen, welche den sumatranischen Hochebenen gleichkommen.

Leider wissen wir aber darüber sehr wenig, und das zeigt uns wieder, dass unsere Zeit zum definitiven Austrag solch allgemeiner Fragen noch

i) Ich spreche hier vorderhand nur von der Ostküste zwischen Cap Tamian und dem Siakfinsse.

nicht reif ist. Wir haben noch zu wenig thatsachliches Material. Ru wenn noch ein halbes Dutzend Forscher ein Jahrzehnt lang Sumatus ganz besonders aber Borneo durchsucht hat, erst dann werden wir is Stande sein, die Wahrheit zu erkennen. Und darum rathe ich trotz de grossen, scheinbaren Beweises, welchen meine Beobachtungen auf Sumi tra für die Wallace'schen Theorien geliefert haben, zur Vorsicht.

Es ware grosse Undankbarkeit meinerseits, wenn ich nicht noch zum Schlusse der Herren des Museums in Leiden, den Director desselben an der Spitze, gedenken wollte, welche sich der Mühe unterzogen haben meine Sammlungen zu ordnen, grösstentheils zu bestimmen und mie mit den systematischen Listen derselben zu versehen, soweit es bislam möglich war. Zugleich ist der Name dieser Herren, Director Dr. Jentin für die Säugethiere, Conservator J. Buttikofer für die Vögel, Cons. Dir Th. W. van Lidth de Jeude für Schlangen und Saurier und Cons. Ritsens für die Insecten, speciell Coleopteren, eine Gewähr für richtige wissen schaftliche Bestimmung.

SÄUGETHIERE

Simia satyrus Linné.

Der Orang-utan von Sumatra ist, wie Schlegel schreibt, von Einigen als eigene, von der von Borneo differente Art, unter den Namen Simila Abelii und S. bicolor beschrieben worden.

Die Malaien auf der Ostkuste unterscheiden zwei Arten von Mawai, wie sie unser Thier nennen, namlich den Mawas Kuda oder Pferde Mawas: derselbe soll ungeheuer gross und stark, mit breiten Backenwülsten sein, mit einer riesigen Haarmahne von fuchsrother Farbe auf dem Rucken und sich durch dieses wilde, rohe Aussehen bedeutend von der anderen Art unterscheiden, welche viel feiner und graciler gebaut sei und desshalb auch Mawas messiah (Menschen-Mawas) genannt wird. Man findet beide an denselben Lokalitäten und schon desshalb vermuthe ich, dass die beiden inländischen Namen nur die beiden Geschlechter ein und derselben Art bezeichnen.

Das südliche Atjeh und die Provinz Langkat, namentlich um das Cap Tamian, ferner die noch unerforschten Länder der Gajo's und Alas bis hinüber auf die Westkuste zwischen Tapanuli und Singkel, das sind die Reviere, wo der Orang-utan, und zwar mehr in den bergigen Binnenstrecken als an der flachen Kuste, keineswegs selten angetroffen wird. Im Hinterlande von Deli und den nördlichen Battaländern kommt er

nur vereinzelt, vielleicht nur versprengt, vor. Ich kannte einen Batta, der das Fell eines solchen, von ihm selbst im Lusungebiete erlegten Thieres, als Schlafmatte benutzte, und an den alten Staatslanzen der Toba- und Karo-Batta-Hauptlinge habe ich öfters Mawas-Haare befestigt geschen; fruher muss sich also das Thier häufiger und wetter nach Suden m gefunden haben, wie ich schon daraus schliesse, dass jeder Malaie in Deli bis nach Siak hinunter den Namen Mawas kennt. Von seinem Vorkommen weiter südlich jedoch wusste ich im Hinblick auf die negativen Berichte Wallace's, Rosenberg's und Junghuhu's, Nichts, und las desshalb mit einiger Verwunderung die Nachricht'), dass im zoologischen Garten zu Rotterdam ein Thier aus dem Innern von Padang, West-Sunstra, vor einigen Jahren gelebt habe. Sollte dies nicht doch aus den nördlichen Theilen nach Padang angebracht sein?

Die Herren von den Tabaksplantagen in Langkat haben schon mehrere dieser Thiere erlegt, und einer derselben hatte die Freundlichkeit, mir das abgezogene Fell eines alten, voll ausgewachsenen Mannchens mit daran befindlichem Kopf und Händen und Füssen zuzusenden, leider in einer Conservirungsslüssigkeit (Petroleum, Wasser und eine Geringigkeit Gin), dass mir ein unbeschreiblich pestilenzialischer Geruch, der noch eine Woche nachher in meinen Kleidern haftete, auf eine Entfernung von 50 Schritten den Erhaltungszustand desselben ankundigte. Beim Oeffnen des thonemen Fasses glotzte mir ein riesiges, wildes und so viel ich beim Laternenschein der Nacht und der vorgeschrittenen Fäulniss erkennen konnte, schwärzliches Gesicht entgegen, dem die zwei ungeheuern Backenwülste ein schreckliges Aussehen gaben. Die fuchsrothen Haare, auf dem Rucken, dicht und reichlich einen Fuss lang, fielen beim Anfassen sofort aus, so dass von der ganzen herrlichen Decke nur der Schädel zu retten war. Derselbe, noch in meinem Besitz, zeigt als Merkwurdigkeit deutlich eine prächtig geheilte totale Fractur des Unterkiesers. Wo mag sich das Thier diese geholt haben? Es wäre nicht unmöglich, dass dieseibe, durch den Hieb einer scharsen Wasse, eines Parangs z. B. entstand, denn der erste Praemolar des linken Unterkiefers, wo die Knochensurbe beginnt, ist zur Halfte glatt durchgehauen. Als Arzt musste ich immer wieder die prachtige Heilung ohne die geringste Dislocation der Fracturenden bewundern, wo doch der Zug der Muskulatur so unendlich grösser als beim Menschen gewesen sein muss!

¹⁾ S. Dr. Jentink in: "Aardrijkskundig Weekblad, orgaan van het Rijks Ethnogr Museum, 18 Aug. 1881, No 44, p. 287."

Ich gebe hier die Maasse des Felles:

voll erwachsenes of

Ganze Lange: 1940 Mm. (mit gestreckten Zehen) Kinn his Scheitel (Gesichtslange): 300 Mm. Breite (mit den Seiten-Wulsten) 255 Mm.

Lange der Hand: 300 Mm.
Breite ,, ,, 120 ,,
Lange des Fusses: 352 ,,
Breite ,, ,, 100 ,,

Nach einer kurzen mitgesandten Notiz ward man auf die Anwesenheit des Thieres in den, die betreffende Pflanzung umgebenden Waldern aufmerksam durch ein furchtbares, auf grosse Entfernung hörbares "Gebrüll" mit dem es sich des Nachts vernehmen liess.

In Gefangenschaft habe ich zwei Exemplare besessen. Beide waren junge Mannchen. Das eine, das erste, was ich besass, erhielt ich durch einen Bekannten, dem es von Gajo-Leuten zugetragen ward. Es war ein liebes, gutmuthiges, aber etwas langweiliges Thier, welches seinen Namen, wenn ich mich noch recht erinnere, Si-Bela, sehr gut kannte. Es besass sein eigenes Tuch, einen alten Sarong, welchen es nur selten aus der Hand liess und überall mit herumschleppte, um sich bei dem geringsten Kältegefühl hinein zu wickeln. Von einem Fremden liess es sich denselben niemals abnehmen, hatte also einen ausgesprochenen Begriff von Eigenthum.

Si-Bela war eitel; das merkte ich, als ich eines Tages mit einem funkelnagelneuen, blendendweissen Sonnenhelm vor ihn hintrat; verlangend blickten seine Augen auf meinen prächtigen Kopfschmuck; man konnte die Begier, auch so was Schönes zu haben, förmlich in seinen Augen lesen, sodass ich beschloss, ihm ebenfalls einen kleinen Hut machen zu lassen. Das nahm jedoch Zeit in Anspruch, und als ich ihn am nachsten Tage wieder besuchte, schien er bereits über den Fall nachgedacht und einen Ersatz gefunden zu haben. Denn was that er, als er mich erblickte? Er ergriff eine alte Zeitung, die er sich zu dem Zweck eigens parat gelegt zu haben schien, riss ein Stück davon ab und legte sich dasselbe auf den Kopf. So geschmückt und das leichte Papier sorgfaltig auf seinem Kopfe balancirend, humpelte er sichtlich stolz davon, indem er sich von Zeit zu Zeit umsah, ob ich ihn auch gehörig bewundere.

Si-Bela brachte auch in Erfahrung, was Katzenjammer ist. Ein mir befreundeter Lieutenant hatte mit seiner Mannschaft einen Reisemarsch

gemacht, und hielt bei mir Rast. Ich regalirte die mude Truppe mit einigen Flaschen Bier, und Si-Bela war hurtig dabei, die Reste aus den weggeworfenen Flaschen kunstgerecht auszuschlürfen. Bald jedoch machten sich die Folgen bemerklich; seine Hinterbeine wollten ihn nicht mehr tragen. Nun war es ausserst komisch, sein grenzenloses Erstaunen über einen solchen Accident zu sehen; er setzte sich, zog mit den Händen seine Beine empor, und prufte sie mit Hand und Auge sorgfaltig, offenbar um die Ursache ihrer plotzlichen Functionsunfähigkeit zu entdecken. Dabei überschlug er sich aber, rollte auf den Boden umher unter dem allgemeinen Gelächter der Soldaten, und konnte sich nicht mehr erheben. Eadlich kugelte er sich zusammen und schlief auf dem Fleck ein, sichtlich schwer betrunken. Ich liess ihn in sein Bett bringen. Als ich gegen Abend wieder nachsah, sass er aufrecht, sah mich mit erbarmungswurdigem Blick an, und hielt mit beiden Händen seinen Kopf. Er hatte furchterliches Haarweh; von Zeit zu Zeit zupste er verzweiflungsvoll an seinem spärlich behaarten Schädel herum, als wolle er das Weh heransziehen. Erst am nachsten Morgen war er wieder völlig wohl.

Der zweite Mawas, den ich von einem Controleur in Langkat zum Geschenk erhielt, war beträchtlich alter und grösser. Er war ebenfalls von Gajo's gefangen und, noch nicht lange gezahmt, ein murrischer fauler Gesell, der am liebsten regungslos in seinem Häuschen hockte. Verschiedene Male suchte er mich zu beissen, wenn ich in anrühren wollte; daher gab ich mich nicht viel mit ihm ab. Er erkrankte bald an Diarrhoe und nachdem ich diese mit einigen Gaben Opium gestillt, versiel er in's Gegentheil, eine Monate lang andauernde, totale Verstopfung. Ich selbst war ebenfalls schwer erkrankt und konnte mich nicht mit ihm abgeben: endlich, nachdem er wochenlang still, das Gesicht nach der Wand gekehrt, in seinem Häuschen gesessen und fast gar Nichts gefressen hatte, stürzte er in einer Nacht vor Entkrästung aus demselben, das auf einem Baumast angebracht und an dem er mit einem Strick um den Hals angebunden war. Der Strick reichte nicht bis auf den Boden, und das arme Thier vermochte sich nicht mehr an demselben emporzuarbeiten. So fanden es Morgens meine Leute erhängt. Bei der Section zeigte sich der Dickdarm in seiner ganzen Länge erfüllt von daumengliedgrossen, runden und steinharten Kothballen, die dicht an einander gereiht waren, wie die Perlen am Rosenkranz. Einige Loffel Castorol im Anfang hatten sicher die ganze Catastrophe vermieden.

Beide Gefangenen besassen eine dunne, klagliche Kinderstimme, die

sie aber nur sehr selten, das letztere Thier namentlich in einigen Nachten während seiner Krankheit, hören liessen.

Hylobates agilis Cuvier.

Schlegel (Museum d'histoire naturelle des Pays-Bas, 12. Livr., p. 17) kannte das Thier nur von der Sudwestkuste Sumatra's (Padang). Neumann in: "Het Paneh- en Bilah-stroomgebied etc." in: Tijdschrift v. h. Aardrijksk. Genootschap, IIe serie, deel III, Afdeel.: Meer uitgebreide artikelen, 1886, erwähnt ihn auch (unter dem Namen H. variegatus) für das von ihm beschriebene Gebiet der Ostkuste, und dann hat ihn die Mitten-Sumatra-Expedition (cf. Midden-Sumatra etc. Natuurlijke historie, zoogdieren en vogels, p. 8) im Palembangschen gefunden. Bei einem Besuch in Bengkalis habe ich im Hause des dortigen Controleurs einen solchen Affen gesehen, der aus dem gegenüberliegenden Siak stammte, wo sie nach Aussage der Malaien gar nicht so selten vorkommen sollen. Der Verbreitungskreis dieses Thieres wurde sich also bis etwa Siak nördlich erstrecken; weiter hinauf ist mir Nichts von seinem Vorkommen bekannt, und in Asahan fehlt er meines Wissens schon vollstandig.

Das eben erwähnte Thier im Hause des Controleurs Cambier war voll-· kommen zahm; es war, soviel ich mich erinnere, ein Weibchen. Es war nicht angebunden, und machte Besuche in allen Häusern herum, wo man es gut behandelte und ihm zu essen gab, namentlich im Hause des Assistent-Residenten. Seinen Schlafplatz hatte es auf einem Baum dicht bei Herrn Cambier's Hause. Zur Essenszeit erschien es regelmässig, stieg durch's Fenster herein und schwang sich mit einem Griff seiner langen Arme leicht und behend auf eine Ecke der Tafel, wo es ruhig sitzen blieb und die Bissen mit einem sansten, fragenden, etwas kollernden: huhuhu! in Empfang nahm, welche ihm sein Herr darreichte. Wenn Fremde an der Tafel waren, so kam es nur zögernd und auf Zuruf seines Herrn herauf, verschwand aber bei der geringsten stärkeren Bewegung sofort zum Fenster hinaus. Von seinem Herrn liess es sich gerne streicheln und liebkosen, benahm sich überhaupt überall so anständig, so zu sagen, schüchtern, dass es im ganzen Kampong ein gehätschelter Gast war.

Hylobates syndactylus Cuvier.

Diese grösste Art der ganzen Gattung ist eine für die Fauna Sumatra's typische Erscheinung und scheint ausschliesslich auf diese Insel beschränkt

m sein, wie der Director des Leidener Museums Dr. Jentink, in den Notes from the Leyden Museum, Vol. XI, p. 19, hervorhebt: "the localities, Southern Tenasserim and Malayan Peninsula, given by Helfer and Wallace, are very doubtful". Auch ist er in der ausführlichen, reichhaltigen Liste Cantor's, über die von ihm in Malakka u. s. w. beobachteten Thiere 1), nicht erwähnt, sondern nur H. lar, agilis und leuciscus, dieser von Borneo (?) und Java.

Die Exemplare des Leidener Museums stammen (cf. Schlegel, l. c. p. 22) alle von der Westküste Sumatra's, und ich konnte diese Anstalt mit solchen von der Ostküste bereichern. Das Verbreitungsgebiet des Thieres, welches auf der Ostküste gewöhnlich Imbau (onomatopoëtisch), seltener Siemang genannt wird, scheint sich demnach über die ganze Insel auszustrecken, mit Ausnahme der Hochebene von Tobah, deren baumlose, flache Savanen für dasselbe keine Existenzbedingungen bieten. Auf den, das Plateau umgebenden, gegen 6000 Fuss hohen, bewaldeten Berggipfeln konnte man jedoch allmorgendlich das Bellen derselben hören (cf. meine Reiseberichte in Petermann's geogr. Mittheilungen, 1883).

Ich habe den vielsachen, guten Berichten über Frei- und Gesangenleben des Thieres nur wenig hinzuzusstigen.

Durch das vollständige Ausrotten der Wälder infolge der Tabakskultur ist auch der Imbau nunmehr in der Küstenebene (von Deli wenigstens) fast völlig verschwunden und in die Bergwälder zurückgedrängt, wie so manches andere Thier. Bei Gelegenheit des Waldschlagens durch die Batta-Arbeiter ward eine Menge dieser Thiere, die sich auf einzelne, vorläufig noch stehen gebliebene Bäume geflüchtet hatten, gefangen; anfangs der achtziger Jahre konnte man beinahe auf jeder Pflanzung ein oder mehrere derselben in Gefangenschaft erblicken; heutigen Tages erhält man sie schon seltener, und muss jetzt 6 Dollars und mehr für einen solchen zahlen, während man sie früher für einen erhielt. In der ersten Zeit meines Ausenthaltes zu Tandjong-Morawa, in Serdang, konnte ich sie von dem Fenster meiner Wohnung aus auf einer circa 100 Meter entsernten Baumgruppe beobachten; die Wälder ringsum erschallten von ihrem Morgenconcert, und bei einem Gang in den tieseren Wäld konnte man mit Sicherheit darauf rechnen, mehrere Trupps derselben zu Ge-

¹⁾ In dem "Journal of the asiatic society of Bengal" vol. XVI, pp. 607—656, 897—952, 1026—1078. Abdruck in "Miscellaneous papers relating to Indo-China. Reprinted for the Straits branch of the Royal Asiatic Society, Vol. II, London, Trübner & C°, Ledgate Hill, 1886.

sicht zu bekommen. Kurz, es war ein sehr haufiges Thier. Ich habe mehrere Dutzend Exemplare geschossen, an einem Tage oft vier bis funf Stuck.

Der Imbau leht gesellig, in Familien von vier bis zu zehn, zwolf Stuck; mehr kann ich mich nicht erinnern, je beisammen gesehen zu haben. Sie bevorzugen gewöhnlich die Laubkuppeln der höchsten Baume, welche über das Niveau des übrigen Waldes emporragen, so dass man sie von einer gunstigen Stelle aus schon auf weite Entfernungen wahrnehmen kann. Fruher, ehe die Tabakspflanzer sie verjagten, waren sie aber auch viel, besonders des Nachmittags, auf kleinen Baumen, ja sogar auf hohen Buschen beim Fruchtschmaus anzutreffen. Auf ebenem Boden habe ich nur ein einzigesmal einen Imbau getroffen, der noch uberdies ganz allein war, was ebenfalls eine Seltenheit ist. Ich ging namlich einen rechts und links mit Busch und niedrigen Baumen bestandenen Waldweg entlang, als keine zwanzig Schritte vor mir ein Imbau langsam und bedächtig hervorkam, mich neugierig, aber keineswegs furchtsam betrachtete und quer über den Weg in seiner characteristischen Weise ging, nämlich indem er seine beiden langen Arme als Krücken auf den Boden stemmte und den Körper zwischendurch nach vorwarts schleuderte, ganz so wie es an Krücken gehende Gelähmte zu thun pflegen.

Diesen Gang, welcher zugleich der des Orang-utan ist, nimmt er an, wenn er sich schnell fördern will; wahrend ich bei Gefangenen nur gesehen habe, dass sie mühevoll auf ihren kurzen, verkümmerten Beinchen einherwatschelten und dabei die furchtbar langen Arme wagrecht balancirend, in Handgelenk und Ellbogen leicht gebogen, ausstreckten. Ich habe Gefangene gekannt, welche eine Strecke von vierzig Fuss auf diese jämmerlich anzusehende Weise zu durchwackeln im Stande waren. An einer Hand geführt, kann jeder Affe ziemlich gut auf seinen zwei Beinen laufen.

Vor 9 bis ¹/₃10 Uhr des Morgens lässt der *Imbau* selten Gebell hören; erst nach der Morgenmahlzeit versammelt sich die Familie auf ihren Spielund Unterhaltungsplätzen, den vorerwähnten grossen Bäumen, und führen sie nun unter ziemlich trägen Spielen ihr Höllenconcert auf, dass in den Stunden von halb zehn bis halb zwölf die Wälder davon wiederhallen. Dasselbe ist auf eine Entfernung von weit über eine Stunde, an günstigen Stellen sogar auf die doppelte Entfernung, zu vernehmen, wie ich auf meinen Reisen auf dem Plateau von Tobah erfuhr; denn da war das hohle Geschrei der *Imbau*'s, welche in den Wäldern der umgebenden Randgebirge hausten, über 10 Kilometer weit zu hören.

Dasselbe besteht in einer chromatischen Tonleiter, welche mit einem tiesen, hohlen, von einem Vorschlag begleiteten Ton beginnt, der wie U-puhp klingt, und, anfänglich langsam, immer höher und schneller wird und zuletzt in einem so höllischen Jauchzen und Bellen gipfelt, dass dem, der gerade unter ihrem Concertbaum sich befindet, Hören und Sehen vergeht. Es ist ein in den höchsten Fisteltönen sich bewegendes, laut herausgeschrieenes Jaaah, das unter Jauchzen, Brüllen, Fauchen, Schreien und Jammern sich schliesslich zu einem kollernden Wauwan-wan herausbildet. Die Tonleiter wird gewöhnlich nur von einem Mitgliede, sehr wahrscheinlich dem Pater familias, vorgesungen, obschon anch hie und da ein anderes Familienglied auf eigene Faust sein U-puhp dazwischen singt; bei der Kraftstelle aber, dem Jaaah, fallt die ganze Familie unisono, mit aller Kraft ihrer respectabeln Lungen, ein. Trotzdem ist dieser Passus nicht so weit zu vernehmen als das hohle, durch die Resonanzkraft des kropfartig aufgeblasenen Kehlsackes hervorgebrachte U-puhp.

Wahrend des Concertes sitzt die ganze Familie gelassen und ruhig zwischen den Astgabeln ihres Spielbaumes oder schaukelt, sich neckend und langsam, an seinen Aesten.

Hat man sich nun angeschlichen und stört dies Stilleben durch einen Schuss, so wird es plotzlich ringsum todteustill, und die ganze Gesellschaft ist wie durch einen Zauberschlag verschwunden. Man muss schon gute und schnelle Augen haben, um zu bemerken, wie die Imbau's sofort nach dem Knall sich insgesammt und pfeilschnell, aber fast gerauschlos, kopfuber von ihrer hohen, isolirten Baumkrone in die tieser begende Laubdecke herabzusturzen scheinen - scheinen, sage ich, denn in Wahrheit sturzen sie nicht, sondern schwingen sich mit ihren langen Armen so schnell und ohne vieler Stützpunkte zu bedürfen, herab, dass diese Bewegung fast ganz einem freien Fall gleicht, wie Snelleman 1) nchtig bemerkt. War man unglücklich und hat einen Fehlschuss gethan, so bedarf es nun, nachdem sie in der zusammenhängenden Walddecke verschwunden sind, wahrlich eines guten Auges und eines noch viel schnelleren Fusses, um eines der sich zerstreuenden Thiere nochmals vor's Rohr zu bekommen; denn mit einer verbluffenden Schnelligkeit und Fertigkeit schwingt sich der Imbau vermittelst seiner entsetzlich weit ausgreisenden Hande von Ast zu Ast, von Baum zu Baum, ohne je die kurzen, krummen Beine zu gebrauchen, sodass der Jager un-

¹⁾ In . Midden-Sumatra".

ten auf dem Boden schon sehr stark laufen muss, um mit ihm Schrit zu halten. Auf der Flucht ist der *Imbau* niemals um sein Fortkommet verlegen; er kennt seinen Weg und weiss auf lange voraus schon jeder Aestchen, welches er ergreifen muss. Wenn man so glücklich ist, in einem lichten Wald den Weg desselben mit den Augen verfolgen zu können, so macht das gerauschlose, fast gespenstische Dahingleiten — Fliegen hätte ich beinahe gesagt — des grossen, kohlschwarzen Thieres einem merkwürdigen, sozusagen unheimlichen Eindruck.

Hat man den Imbau aber in die Enge getrieben oder angeschossen, dass seine Schnelligkeit gelähmt ist, so weiss er sich oft in einer mit Parasiten bewachsenen Astgabel so zu verstecken, dass man ihn nicht mehr erblicken kann. Ist ihm ein Arm zerschmettert, so hängt er an dem andern oft noch eine halbe Stunde lang, ehe er sausend zur Erde stürzt. Und auch dort weiss er sich oft noch davonzuschleppen, und wehe dem Jäger, der ihm dann unvorsichtig zu nahe kommt! Mit aller Kraft seiner noch gebrauchsfähigen Extremitäten packt er des Verfolgers Kleider und begräbt seine schreckenerregenden, fast zoll langen, spitzen Eckzähne wüthend in dessen Fleisch.

Eine rührende Szene beobachtete ich einst bei einer Imbaumutter, der letzten, die ich schoss. Ich hatte dieselbe schwer angeschossen, so dass sie sich nicht mehr fortbewegen konnte. Gelähmt hing sie mit ihren Handen an dem Ast, während ihre Augen voll Angst und Schmerz auf mich herunter blickten, der ich jeden Augenblick ihren Sturz erwartete. Plötzlich löste sie eine Hand, griff nach ihrer Brust und warf mir etwas schwarzes — ein Junges — vor die Füsse. Gleich darauf stürzte sie entseelt hinterher. Das arme Thier fühlte offenbar, wie seine Kräfte nachliessen, und fürchtete, sein Junges durch den Sturz zu zerschmettern; es warf desshalb dasselbe freiwillig von sich. Ich habe nach dieser Szene keine Imbau's mehr zu schiessen der Muth gehabt. Das Junge lebte, hatte aber einen Arm gebrochen und ging trotz der sorgfältigsten Pflege nach einigen Tagen zu Grunde. Es war noch sehr jung, nur ganz dunn behaart, und hatte ein ungemein faltiges Gesicht, das es gewöhnlich zu einer weinerlichen Grimasse verzog.

Der Imbau hat ein für einen Affen schones und intelligentes Gesicht mit lebhaften schwarzen Aeuglein. Die Intelligenz offenbart sich besonders im Gefangenenleben. Sogar altere Thiere, ganz besonders aber die Jungen, werden sehr zutraulich und zahm; nur muss man sich viel mit ihnen abgeben. Ein Bekannter von mir besass einen Imbau schon seit Jahren, dessen Anhänglichkeit an seinen Herrn wunderbar war; natür-

sich war derselbe nicht angebunden, sondern lief frei umher. Die Dame einer der meinigen benachbarten Pflanzung besass ferner ein junges Thier, das vollständig wie das Kind des Hauses sich geberdete und gehalten ward; es hatte seine Kleider, sass am liebsten auf dem Schooss der Dame, gab auf Befehl den Besuchern die Hand u. s. w.

Ein Parchen, das ich einst erhielt, flog im Anfang, so oft ich das Zimmer betrat, in welchem sie eingesperrt waren, mit einem ängstlichen Hu! in die entfernteste Ecke unter dem Dach. Erst nach und nach wurden sie etwas weniger schen, blieben jedoch stets auf ihrer Hut, wahrscheinlich weil ich zu wenig Zeit hatte, mich mit ihnen abzugeben. Rohe Eier liebten sie sehr, wussten sie aber nicht aufzumachen, und liessen sie regelmässig bald zur Erde fallen. Dann kamen sie herbei, und führten das Ausgelaufene in der bekannten Weise mit den langen Fingern zum Mund. Ein geöffnetes Ei nahmen sie mir mit einem fragenden Hu? aus der Hand, entfernten sich in ihre Ecke und holten sich den Inhalt ebenfalls mit den Fingern heraus.

Zum Schluss will ich noch bemerken, dass man auch öfters mitten in der Nacht plötzlich das kollernde Bellen der *Imbau's* vernehmen kann. Es ist nicht die Tonleiter mit nachfolgendem Gejauchze, welche man morgens vernimmt, sondern eine Reihe hastig, gewissermassen unwillig hervorgestossener Töne, die wie ein kollerndes "Huhuhu" klingen. Durch dasselbe werden dann auch andere Thiere erweckt und es schliesst sich gewöhnlich dann das Schnarchen der *Lutung*-Affen und anderer Thiere an, um nach einer Weile wieder der früheren Todtenstille Platz zu machen.

Dann sagen die Malaien: "Jetzt hat der Imbau einen nachtlich umberschweisenden Elephanten, oder ein Rhinoceros, oder einen Tiger geschen, und die andern Thiere gewarnt".

Die auf dem Titelblatt vorkommenden Bilder sind nach Photographien begestellt, die nach dem lebenden Thiere, dem zahmen Exemplare der oben erwähnten Dame, genommen und mir freundlichst überlassen wurden. Zum Schluss gebe ich noch die Maasse einiger von mir geschossenen Exemplare. Wie die Schussliste beweist, habe ich Weibehen mit Jungen pur in der zweiten Halfte des Jahres geschossen.

Die Jungen der, am 2. August, 20. September 1880 und zwischen Juli und October 1882, geschossenen Weibchen waren ca 10 Tage alt, das Junge des am 1. November 1880 erhaltenen Q nach meiner und der Malaen Schätzung etwas über einer Monat. Die Hauptgeburtszeit dürfte man danach etwa in die Monate August und September verlegen.

Die kleinen, ca 10 Tage alten Jungen hatten ein merkwürdiges Au sehen. Die Haut war ihnen allerorten zu gross, so dass sie in unzähl gen Falten und Runzeln um das entsetzlich magere Knochengeste herumhing. Das Gesicht bekam dadurch, namentlich durch die eings sunkenen Backen und die faltigen Mundwinkel, einen so bitteren Le denszug, wie man es nur je bei sehr schlecht genährten, sterbende Säuglingen beobachten kann. Die Haut war, im Gegensatz zu dischwarzgrauen der Mutter, bei den Zehntagigen braunlich fleischfarbei und am Gesicht, Brust, Bauch und der Innenseite der Schenkel fanackt. Die übrigen Theile waren dunn und spärlich mit langen, schwizen Haaren besetzt. Der Nabel war schon ganz verstrichen, kaum met zu erkennen.

Maasse der zwei 10-Tage alten Jungen:

Ganze Länge Hand-Fussspitzen.	Troch. ms bis mall.	•			Acromion Handwurs
520	130	70	70		180
580	140	70	50		170
Acrom. Ellbogen.	Handlänge.	Klafterweite.	Brustumfang.	Daumen.	Mittelfing
90	8 o	560	180	30	45
90	70	540	160	30	40

Das ca I Monat alte Junge hatte folgende Maasse:

Ganze Länge.	Tr. major Fussgelenk.	Tr. maj. bis Knie.	Ferse bis Zehenspitze.	A cron Handv		Acr. Ellb
605	145	70	75	200	0	90
Handlänge	. Brustumfan	g. Kopfu	mf. Scheite	lbogen.	Ohrbo	gen.
90	190	220	12	10	12	5
		Brustbeinran Symphyse.	d Kehlk bis Symp	•	٠	
140		210				

MAASSTABELLEN VON ERWACHSENEN EXEMPLAREN

Hylobates syndactylus.

BEMERKUNGEN.			Gesch. 24, II, 1880.	16, X, 1880.	3, IV, 1889.		23, V, 1869.		170 190 Gesch. I, IV, 1880.		
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	Mundspelte. Breite d. Kasen-			1	8	76	2	8	•	2	
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Unb	Gesicht			8	8	76	20	2	•	8	
Tu:	Sagittal bogen.			160	180	180	140	146	•	120	
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*) Die Behaarung dieses Weibes war etwas abnorm. Nämlich die Haare um die Genitalien und an der Innenseite der Schenkel, forner im Gesicht, am Kinn, sowie an Hand. und Fusswurzel waren schmutziggelblich — partieller Albinismus? Das Junge war gewöhnlich gefarbt.

e) Mit Jungem. In der zweiten Hälfte d. J. 1882 geschossen.

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Semnopithecus pruinosus Desmarest.

Bekannt von Sumatra, Borneo, Malakka und Banka.

Dieser aschgraue, am Bauch weissliche und mit einem Haarschopf verse hene Affe, von den Eingebornen Lutung oder Lutong genannt, ist über all häufig, und lebt in Trupps, oft bis zu zehn, fünfzehn Stück bei sammen, vom Saume des Meeres an bis hinauf an die Hochebene vor Tobah. Den dichten Urwald vermeidet er, und hält sich am liebsten ir den Mangrovewäldern der Küste und dem hohen und niedrigen Busch alten Culturlandes auf.

Sein Ruf, den er als Warnungs- oder Verwunderungszeichen ausstösst ist ein lautes, weithin hörbares Geschnarche, das wie "Ki-Ha-Hauh' klingt und das ich besser nachmachen als beschreiben kann. Die ge wöhnliche Familienunterhaltung dagegen besteht in dem bekannten, las menden Affengekicher und Geschwätze. Auch dieser Affe lässt oft de Nachts, wenn ihn etwas erschreckt, sein hohles, schnarchendes Ki-Ha Hauh hören.

Die Jungen sind in der ersten Zeit nach der Geburt röthlich behaart In der Gefangenschaft wird der Lutung selten gehalten, und mussich dann gefallen lassen, seinen schonen, langen Schwanz abgehackt zu sehen. Es lebt aber gewöhnlich nicht lange, sondern trauert sich bak zu Tode.

Spassig benimmt sich der Lutung bei schwerem Regenwetter. Dans sucht er sich nicht etwa ein Versteck aus, das ihn vor dem Unwetter schützen könnte; er wählt im Gegentheil einen womöglich abgestorbenen ganz freistehenden Baum, ohne Laub und dort hockt er sich, Jamme und Unglück in seinen Mienen, jedem Regentropfen preisgegeben, nieder indem er die Arme über dem Kopfe faltet 1) und den Rücken der Wetterseite zukehrt. Der lange Schwanz hängt gerade herab. Ein solche Baum ist oft von der ganzen Familie besetzt, wobei sie aber selten (num Mutter und Kind) sich aneinanderschmiegen, sondern jedes Individuum sein eigenes Aestchen wählt. Man kann sie dann, weil sie frank und frei auf dem kahlen Baum sitzen, schon auf weite Entfernungen wahrnehmen. Sie scheinen bei solchem Wetter weder zu horen, noch zu sehen, denn man kann ganz ungescheut bis dicht an ihren Baum herangehen, und ihnen sogar mit der sonst so gefürchteten Flinte drohen, ohne dass die erbärmlich betrübt dreinschauende Familie zur Flucht bewogen wird.

¹⁾ Ich constatire dies ausdrücklich, da Darwin dies schon aus der Stellung der Haare vermuthete.

Eu mannliches Thier, das ich am 18. Juli 1880 zu Tandjong-Morawa schoss, hatte folgende Maasse:

Ganze Lange 150 Cm.
Schwanzlange 75 ,,
Lange der Arme 45 ,,
,, Beine 54 ,,
Brustumfang 40 ,,
Kopfbogen 16 ,,

Semnopithecus femoralis Horsfield.

Schlegel sagt in seiner Monographie, dass dieser Affe bislang nur aus den Waldern des Berges Ophir auf der Westkuste Sumatra's bekannt sei. Ich weiss nicht, ob seitdem noch andere Localitaten bekannt wurden.

Der Gijak-gijak, wie er von den Malaien seines Geschreies wegen genannt wird, ist seltener als der Lutung, dem er übrigens im Fell ziemlich gleicht. Nur ist der Bauch reiner weiss, und Hände und Füsse russschwarz. Das Gesicht ist in der obern Halfte von der Nasenspitze an schmutzig-ultramarinblau, in der untern fleischfarben. Ganz junge Thiere sind goldgelb behaart.

Der Gijak-gijak ist ein scheues, verborgen lebendes Thier, das auch im Hochwald vorkommt, ohne sich gerade darauf zu beschränken. In der Nahe von Wohnungen sucht er sich immer die dichtesten Büsche zuf, sodass man ihm selten frei zu Gesicht bekommt. Er lebt nicht in 50 zahlreicher Familie wie der Lutung, gewöhnlich nur in einzelnen Paren; die stärkste Truppe, welche ich gesehen habe, bestand aus zechs Stuck.

Er macht wenig Geräusch, und verräth seine Anwesenheit gewöhnlich wirder durch sein lautes, gellendes, in gemessenen Zwischenpausen ganz urwemittelt und plötzlich ausgestossenes Geschrei, ein langsam beginnendes, allmählich schneller werdendes und wie Gelächter endigendes: "Gjak-gjak-gjak-gjak-gjakgjakjakjakjak."

Früh Morgens und bei fallendem Abend hört man dasselbe am häufigsten. Ein ansgewachsenes og hatte folgende Maasse:

Ganze Lange (Finger-Schwanzspitze) 157 Cm.
Schwanz 74 ,,
Rumpflange 51 ,,
Armlange 37 ,,
Handlange 13 ,,

Daumen	2 (m
Zeigefinger		
Mittelfinger		
Goldfinger		
kleiner Finger		
Vorderarmlänge	4,5 17	"
Umfang d. Vorderarms	II	"
" " Oberarms	13	
Kopfbogen v. Mund bis Hinterkopf	16	,,
Ohrbogen	14	"
Kopfumfang		
Nasenspitze bis Gehörgang.	9	,,
Mundspalte		,,
Brustumfang		,,
Beinlänge		,,
Unterschenkellänge		"
Länge der Fusssohle (bis z. Zehenspitze)		"
1. Zehe.	3	"
2. ,,	3,5	,,
3. "	5	,,
4. ,,	5	,,
5. ,,	4	,,
Oberschenkelumfang	20	"
Unterschenkelumfang	I 2	,,

Cercocebus cynamolgos Schreber.

Dies ist das frechste, gemeinste und unverschamteste Thier auf der ganze Ostkuste, wo es im Volksmund Krah (Kärdh) heisst, ein wahrer Uebera und Nirgends. Nähert man sich zu Schiffe der Küste von Deli zur Ebbezes so sieht man schon von weitern die nackten, sich weit in das Meer hinau dehenden Schlammbänke von hunderten dieser Affen belebt, wo sie, sie auf dem zähen Schlamm langsam fortbewegend, mit schmutzigen Finger ihr Futter zusammenklauben. Fährt man dann weiter den Fluss hinauf, indet man sie in dichten Reihen, die das nur wenige Schritte weit vorbe fegende und pustende Dampfboot nicht im Geringsten genirt, an den Ufer sitzen, um mit aufmerksamen Augen allen Unrath zu mustern, den der Ebb strom nach dem Meere führt. Um eine halbfaule Orange oder Ananas, die eine glücklich ergattert hat, kann dann ein stundenlanges Gerauf und Gezank entstehen. Die grossen Rhizophorenwälder der Flussdelta's bilden die Haup

domane unseres Thieres, doch ist dasselbe auch in allen cultivirten und bewohnten Strecken, bis hinauf an die Hochebene von Tobah sehr häufig und ein durch seine freche Gefrässigkeit schädliches Thier, das dem Eingebornen tagtäglich die Fruchtgarten plündert.

Vorstehende Zeilen hatte ich noch in Tandjong-Morawa niedergeschrieben, und, abgerusen, auf meinem Schreibtisch liegen lassen, der aussen auf einer freien Veranda stand. Zurückkommend, sah ich von weitem schon etwas sich um denselben bewegen und glaubte, es sei Besuch angekommen. Näber kommend, merkte ich erst, welcher Art dieser Besuch war. Eine vielköpfige Affenfamilie sass auf meinem Schreibtisch. und der alte pater familias war damit beschäftigt, diese seine Lebensbeschreibung mit Augen, Handen, Fussen und Zahnen zu probiren, vielleicht aus Wuth über seine darin enthaltene, wenig schmeichelhafte Characteristik. Andere Familienglieder hatten meine Bücher vor sich und waren beschäftigt, deren Inhalt sich im wahren Sinn des Wortes einzuverleiben. Ein hoffnungsvoller Sprössling gar hatte alle vier Extremitäten nebst Schwanz in das Tintenfass getaucht, und damit nicht blos sein Gesicht, sondern leider auch die halbe Veranda, und namentlich sammtliches Papier auf eine Manier "beschrieben", dass mir vor Schreck und Verdruss die Haare gen Berg standen. Und dabei zogen sich die Frechlinge erst zurück, als ich mit gehobenem Stock schon wüthend die Treppe hinauf sprang, der Familienalteste sogar unter Mitnahme einer Rolle Papier!

Der Krah wird ausserordentlich häufig in Gefangenschaft gehalten; er wird sehr zahm und ist auch ziemlich gelehrig. Auch er muss gewöhnlich sich seinen langen Schwanz abhauen lassen und wird dadurch dem Schweinsaffen sehr ahnlich. An Grösse steht er jedoch stets hinter demselben zurück.

Es gibt bekanntlich ein Sprichwort, das von zwei zankischen Leuten sagt: sie leben wie Hund und Katze mit einander. Für unsere Gegend konnte man mit Fug und Recht, da der Katzen nur sehr wenige sind, dasselbe umwandeln in: wie Hund und Krah mit einander leben. Denn, sobald die Hunde eine solchen Affen spüren, fahren sie mit wüthendem Gebell darauf los, und können, vor Wuth schäumend und bellend, stundenlang unter den Bäumen hin und her laufen, stets neu gefoppt von den, in den Zweigen oben herumspringenden, sie herausfordernd anschnarchenden Affen. Andere Affen, wie der Lutung, machen sich vor den Hunden bald davon; diese Frechlinge aber machen sich ein ausgesprochenes Vergnügen daraus, die Hunde möglichst viel und lang zu ärgern.

Meinem Hause gegenüber, jenseits eines schmalen Sumpses, wohnte in einem dichten Bambuwald eine zahlreiche Krah-Familie; allmorgendlich nun, sobald sie mit dem Morgen-Imbiss sertig waren, nicht srüher, suchten sie die Hunde zu entdecken. War dies gelungen, so stiess der Entdecker einen sörmlichen Kampsruf aus, den die Hunde mit einem hellen, jauchzenden Jagdlaut beantworteten und sich regelmässig darauf in den Sumps und das Gebüsch mit allen Zeichen der Wuth hineinstürzten, um ebenso regelmässig nach einer halben oder ganzen Stunde abgehetzt, nass und voll Schlamm mit leeren Mäulern zurückzukehren. Die Sache artete zuletzt in ein regelrechtes Spiel aus, und kein Theil hätte sich wohl gesühlt, wenn einmal dieses Morgenturnier unterblieben wäre.

Ein kleines, noch nicht völlig erwachsenes Mannchen hatte folgende Maasse:

Ganze Länge:	740 Mm.	
Armlänge	290 "	
Beinlänge	270 "	
Schwanzlänge	400 ,,	
Rückenlänge (Schwa	nzwurzel-Kopf)	24 Cm
Kopfbogen (Muntspa	alte-Hinterhaupt)	15 ,,
Ohrhogen	• ,	T T

Ein altes, ausgewachsenes, mit Backenbart versehenes Mannchen maass:

Ganze Lange:	970 Mm		
Schwanzlänge	540 ,,		
Kopfbogen	170 "		
Armlänge	38o "		
Bein	350 "		
Brustumfang	290 "		

Macacus nemestrinus Desmarest.

Das ist unser "Schweinsaffe", der Lamponger Klapperaffe (von Klapor = Kokosnuss), oder "Meester Kees" der Hollander, der "Bru" der Malaien.

Es ware falsch, aus der grossen Hausigkeit des Thieres in Europa auf gleiche Hausigkeit in seinen heimathlichen Waldern zu schliessen. Er ist hausig, ja, aber keineswegs gemein, wie z. B. Krah und Lutung. Ich mochte sogar behaupten, dass in Deli z. B. mehr zahme Exemplare als wilde anzutreffen sind.

Der Bru bevorzugt entschieden den Boden, obwohl naturlich auch er ein guter Kletterer ist, und stattet besonders gern den Maisseldern seine Familienvisiten ab. Seine Familie beträgt selten mehr als ein Dutzend.

Der Anführer ist immer ein sehr grosses, stattliches, robustes Thier mit furchteinflössendem Gebisse und voll Muth, selbst Menschen gegenüber. Die Abbildung bei Brehm gibt nicht im Entfernteten einen Begriff von der Grösse und Stattlichkeit eines ausgewachsenen Mannchens. Mit Wurde und Gravitat schreitet er auf allen Vieren vor seiner Heerde her, von der Grosse etwa eines mittleren Schäferhundes. Naht sich ein Mensch, so sicht die Familie in den nächsten Busch; der Führer aber macht Front and fletscht auf so entsetzliche Weise die Zähne, dass man, wenn ohne Gewehr, ihn gerne in Ruhe lässt. Ich kenne einen Tabakspflanzer, der von einem solchen alten Männchen, das frei auf der Strasse sass, zur Umkehr gezwungen wurde. Ein anderer Pflanzer erzählte mir, dass er ebenfalls einem Bru auf der Strasse begegnet sei, der sich langsam vor ihm bis an den Waldsaum zurückgezogen habe; um ihn zu verscheuchen, warf ihm mein Bekannter seinen Stock nach; gleich darauf aber sei dieser mit ziemlicher Gewalt auf ihn zurückgeworfen worden. Die Malaien furchten den Kampf mit dem Bru und behaupten, der Mensch unterliege stets. Ich finde das gar nicht unglaublich. Danach ist die Bemerkung Brehm's, dass sein Wesen entschieden gutmüthig sei, zu rectificiren.

In der Nahe menschlicher Wohnungen ist der Bru immer auf dem Kriegspfade, schlau, vorsichtig, geräuschlos, aber niemals feige oder angstlich; beim Fressen auf einem Mais- oder Reisfelde wird immer eine Wache aufgestellt.

Will man aber den Bru in sorglosen Familienleben beobachten, so muss man in den dichten, entlegenen Urwald gehen; dort ist seine eigentliche Heimath, sein Tummelplatz, aber man hat nicht gar zu oft den glücklichen Zufall, einen der spärlichen Trupps dort anzutreffen. Ein lautes, eigenthümliches, halbklagendes Hu-Hu-Hu, je nach dem Alter des Rufers von hohem oder tiefem, von zartem oder wildem Klang, verräth schon auf eine gewisse Distanz ihren Aufenthalt. Seltener und nur von den jüngeren Gliedern, wird das gewöhnliche Affengeschrei und Gezwitscher ausgestossen; die Familie ist, selbst bei Scherz und Spiel, viel ruhiger und gesetzter, als Krah und Lutung.

Niedere Bäume, Gebüsch und Boden des schattigen Hochwaldes, niemals die hohen Baumwipfel selbst, sind der Tummelplatz des Bru.

In Gefangenschaft wird der "Meester Kees" wie gesagt, ausserordentlich haufig, von Hoch und Niedrig gehalten, fast in jedem Pferdestall ist ein solcher angebunden "damit sich die Pferde nicht langweilen".

Von ihrer eminenten Gelehrigkeit brauche ich wohl nicht zu sprechen,

jedermann weiss ja, dass die Malaien sie zum Pflücken (richtiger: Abdrehen) der Kokosnüsse abrichten, und hat ihre Kunststücke in Europa zu bewundern oft genug Gelegenheit. Bemerken will ich nur, dass der Bru selten mehr als drei Kokosnüsse nacheinander von ihren zahen Stielen abzudrehen im Stande ist; die dritte Nuss gehört ihm; dass weiss er und halt streng darauf; die Malaien versicherten mir, dass wenn man ihm diese wohlerworbene Nuss vorenthalte, er fernerhin den Dienst verweigere.

Er versteht die Worte seines Herrn ganz genau, der ihm von unten zuruft, welche Nuss er abdrehen soll, und wohin er sich zu wenden habe.

Nycticebus tardigradus Linné.

Ein schläfriger, stets murrischer und bissiger Geselle, der den Tag in einem Astloch oder sonst in einer geschützten Baumhöhlung verschläft, indem er sich zusammen kugelt, d. h. den Kopf nach dem Bauch zu herabbiegt und mit den vordern Extremitäten zudeckt. Erst mit dem fallenden Abend wird er lebendig und schleicht dann langsam und träge auf den Aesten dahin; ich habe auch einen schon auf dem Boden über den Weg schleichen sehen, zwischen 6 und 7 Uhr des Abends. Ich stelle mir jedoch vor, dass dies eine Ausnahme war, denn der Bukang, wie ihn in Deli die Malaien nennen, ist ein Baumthier, das zwar träge, aber ungemein geschickt klettert.

Obwohl ihn der Jäger wohl kaum je im Walde zu Gesicht bekommen wird, ist er doch ein häufiges Thier, das mir alle Augenblicke von Malaien oder Batta's für einen halben Dollar angebracht wurde, welche dasselbe beim Waldschlagen gefangen hatten. Es macht einem in der Gefangenschaft wenig Freude, da es sich im Käfig sofort zusammen kugelt und einschläft; stösst man es an oder sucht es zu erwecken, so erhebt es langsam und wie verwundert über die Störung den Kopf mit den ungeheuer grossen, schläfrig dreinglotzenden Kugelaugen, und fährt plotzlich blitzschnell mit demselben unter einem zischenden und schwach meckernden Gefauche blindlings nach der Gegend, woher die Störung kam, wobei es oft genug mit der Schnauze an das Gitter des Käfigs anrennt und dann wüthend hinein beisst. Das Alles geschieht, ohne dass der Rumpf sich von der Stelle bewegt, und gleich darauf hat der Bukang wieder seinen Kopf zwischen die Beine eingemunmelt und schläft weiter.

Viele Male kann man ihn so aufwecken, und stets wird er ganz auf die namliche Weise in trager Wuth seinen Kopf an das Gitter anstossen, bis er sich endlich zu dem ungeheuern Entschluss ermuntert, seinen Leib aufmeilen und bitter gekrankt eine andere, Insulten weniger ausgesetzte Ecke aufzusuchen.

Keines der Thiere, die ich in Gefangenschaft gesehen oder selbst gehalten, und das waren fast zwei Dutzend, lernt seinen Warter kennen, und keine Hand durste ihr Fell berühren, ohne gewiss zu sein, tuchtig gebissen zu werden.

Der Bukang kann bei Pisangs und sonstigen Früchten, wenn er Insecten oder Fleisch dazu bekommt, jahrelang in der Gefangenschaft aushalten.

Ein erwachsenes Weibchen, das ich am 27. Febr. 1880 in Marolam todt erhielt, hatte folgende Maasse:

Ganze Länge	32 C	m.
Lange des Kopfes	7,	,
Entfernung der beiden Ohren	von einander 6,	,
Lange der Vorderbeine	21 ,	,
" " Hinterbeine	20,5 ,	,
" des Schwanzes	2,	,
Leibesumfang über die Brust	16,	,

Galeopithecus volans Linné.

Auch dieses Thier bekommt man selten tagsüber zu Gesicht, obwohl is in den Waldern gerade nicht selten ist. Es sitzt still und ruhig und durch seine eigenthümliche Farbung vortrefflich geschutzt, wie ein Stück der Rinde selbst fest angeklebt an seinem Lieblingsbaum, gewöhnlich in einer Astgabel oder sonst an einem passenden Platz, bis der fallende Abend es zu seiner Thatigkeit erweckt. Die Familie ruht gewöhnlich dicht beisammen, so dass man mit zwei Schrotschüssen beide Ehegatten hermeterholen kann, wie ich dies selbst mit meinen Jägern öfters gethan habe. Das Weibehen hatte stets nur ein einziges Junge.

Einigemale wurden mir Mutter und Kind lebendig gebracht, aber es gelang mir nie, sie über acht Tage am Leben zu erhalten. Sie benahmen sich immer sehr zart und schüchtern, liessen sich gern und willig anfassen und streicheln, wobei die Mutter eine Art von meckerndem, inpendem Schmatzen hören liess, und frassen scheu am ersten Tage etwas von den vorgehaltenen Pisangs. Dabei steckte zu meiner Verwunderung auch das Junge hie und da, falls ihm sein Alter dies schon erlaubte, den Kopf mit den grossen, runden, neugierigen Augen aus dem Hautmantel der Mutter hervor, und nahm sich ebenfalls einige

Bissen. Ich liess den Gefangenen jedes mal Stangen, Astgabeln und Rindenstücke herrichten, wie ich eben dachte, dass es ihnen am besten passen möchte; doch bevorzugten die meisten eine horizontale Stange, woran sie sich mit den vier Extremitäten aufhingen; der Schwanz war einwärts geschlagen, und bildete mit dem an ihm befestigten Theil der Flughaut den Boden für den Sack, worin das Junge stak. Des Morgens musste man sie jedoch regelmässig in der fernsten Ecke unter dem Dach suchen, wo sie offenbar während der Nacht grosse Anstrengungen gemacht hatten, ins Freie zu gelangen. Nach zwei, drei Tagen jedoch, trotzdem sie stets und gerne Pisangs und Milchreis frassen, wurden sie schwächer und schwächer, konnten sich nicht mehr an ihrer Stange halten, stürzten herab, blieben hülflos unten liegen, und waren nach einem oder zwei Tagen todt; auch die Jungen folgten bald.

Bemerken muss ich noch, dass das Thier in Deli im dichten Wald zu finden ist, während es Snelleman auch häufig an bewohnten Plätzen fand.

Von einem nächtlichen Geschrei der Thiere, wie es Junghuhn beschreibt, habe ich eben so wenig wie Snelleman gehört.

Die Malaien in Deli haben keinen speciellen Namen für dieses Thier, und wersen es unter der Bezeichnung Kubung (der Name Kubin ist nicht bekannt) mit den überall häufigen Pteromys und Sciuropterus-Arten zusammen.

Nachfolgend die Masse eines Parchens, welches von meinem Jager am 20 Novemb. 1881 auf einem Baum geschossen ward. Die Mutter trug ein schon vollkommen behaartes Junges an der Brust.

් 58	Bo Mm.	Ganze Länge	645	Mm.	Q
8	35 "	Kopflänge	85	"	
5	, , ,	Ohrbogen	55	"	
23	35 "	Rückenl. (WiderrSchwanzwurz.)	250	17	
22	.o "	Schwanz	260	"	
32	5 "	Länge d. Vorderbeine	375	"	
27	10 ,,	" " Hinterbeine	310	,,	
16	is "	Distanz v. Vord. bis Hinterbein	190	1)	

Felis tigris Linné.

Nunmehr wollen wir uns zunächst zu den Raubthieren wenden.

"Der gefürchtete Königstiger ist auf der Ostkuste Sumatra's ein leider nur zu häufiges, aber, wie ich gleich hinzusetzen will, dem Menschen nur wenig gefährliches Thier, das selbst vor dem miserabelsten Kuli,

sofem er nur aufrecht einhergeht, sich feige verkriecht. Ich habe während der funf Jahre in Serdang, von denen ich täglich einige Stunden in Besch und Wald zubrachte und wo notorisch viele Tiger sich herumtrieben, wie die oft nach Tausenden zählenden Fussspuren auf dem Strassensand des Morgens nach einem leichten Regen bewiesen, ausser den vielen in der Falle gefangenen, nur zweimal demselben in Freiheit begegnet. Das erste Mal war es ein halbtodtes, stark verwundetes Thier, von dem ich am Schluss noch etwas sagen will, und das andere Mal ein allerdings vollkräftiges Thier, auf das ich unerwartet bei einer Streise stiess, das aber mit einer solchen Vehemenz vor mir Reissaus nahm, obwohl ich mutterseelenallein war, dass es ganz unmöglich war, ihm tine Kugel nachzusenden. Nur Leute in gebückter und heckender Stellung werden von ihm angegriffen und weggeschleppt, besonders gern die Kuli's auf den Tabaksfeldern, die im Wald umher zerstreut sind, beim Ausjaten des Unkrauts, und sehr oft auch beim Verrichten gevisser Bedürfnisse abseits vom Wege. Ein aufrecht gehender Mensch halt sich wie gesagt, vor dem Angriff des Tigers, auch in der Nacht so gut wie sicher; auf der Ostküste in den Tabaksdistricten, ist der Verkehr, besonders unter den Kuli's, zur Nachtzeit fast häufiger als am Tage. Der Tiger hatte sonach herrlich Gelegenheit, sich ausschliesslich von Menschenfleisch zu nähren; und doch, wie selten hört man, dass der Tiger den und jenen geholt habe! Es ist dies ein grosser Gegensatz zu dem Verhalten des Thieres in Britisch-Indien, ja selbst schon auf Java, ksst sich aber, glaube ich, vollkommen aus der Thatsache erklären, dass es ihm auf der Ostkuste niemals an Wild gebricht, namentlich an Hirschen und Schweinen, deren es grosse Mengen gibt, so dass er immer gentgend zu leben hat und nicht gezwungen ist, seine natürliche Scheu vor dem Menschen zu überwinden. Hat er sich jedoch einmal an Menschensleisch gesattigt, so lernt er es auch hier als besonderen Leckerbissen schätzen und verlegt sich häufiger auf die Menschenjagd: er wird mm gefurchteten "Menschenfresser". Solcher haben wir in Deli schon mehrere gehabt, die in kurzer Zeit mehrere Eingeborne hinter einander wegfingen, und die Pflanzer hatten ganz recht, mit allen Mitteln die Ausrottung gerade dieser Gourmands anzustreben. Räubereien vollführt anch hier der Tiger übergenug. Er schlägt Pferde und Rinder in den offenen Stallen, und klettert oder springt damit über acht Fuss hohe Umzannungen, wie ich selbst gesehen habe (ein Tiger sprang auch einmal, mit einem lebenden Schwein im Rachen, vom Ufer aus über einen malaiischen Kahn (Sampan) hinüber in den Fluss), er holt die Fullen

und Kälber auf der Weide vor den Augen des entsetzten Hirten weg und die Hunde des Nachts von der Veranda, wobei er manchmal die aus armdicken Hölzern hergestellte Brustung durchschlägt. Alle vom Tiger geschlagenen Thiere, die ich gesehen habe, waren am Kopfe gepackt, und die Wirbelsaule des Nackens mit einem Tatzenschlag, meist ohne aussere Verletzung gebrochen. Von der Frechheit des Tigers möge folgende Thatsache zeugen, die mir von einem Pflanzer erzählt ward: des betreffende Herr hielt des Nachts auf seiner Veranda einen Wächter, der sich nach seinen Rundgängen um's Haus auf einen der grossen, aus Rottan geflochtenen, langen Liege-Stuhle niederzulegen pflegte und seinen Hund an das Stuhlbein festband. Als er wieder einmal, und wahrscheinlich eingeschlummert, dalag, springt plötzlich ein grosser Tiger über die Brustung, welche acht Fuss vom Boden entfernt war, packt den Hund und will mit ihm davon. Da jedoch derselbe angebunden war, zerrt er auch den Stuhl mit über die halbe Veranda, während der arme Nachtwächter herabpurzelte und in seiner Angst mit dem Kopf und halben Oberleib, direct durch die dunne Atapwand in das Schlafzimmer seines Herrn fuhr, dann aber stecken blieb, so dass seine hintere Hälfte sich noch draussen befand. Bis aber der zu Tode erschrockene Herr mit seinem Gewehr hinauseilte, war der Strick gerissen und der Tiger mit dem Hund verschwunden.

Auch weiss ich einen Fall, wo der chinesische Koch eines Pflanzers, der in einem kleinen Atapverschlag neben der isolirt stehenden Küche schlief, von einem unter der Wand sich durchzwängenden Tiger aus seinem Bette geholt und davon geschleppt ward.

Gefangen wird der Tiger meist in langen, schmalen, aus schenkeldicken Stämmen erbauten Fallen, in die als Lockspeise eine Ziege oder ein Hund angebunden wird. Will man jedoch Erfolg haben, so muss man seine Spuren gut zu verdecken verstehen. Gewöhnlich geht einige Zeit darüber hin, bis der Tiger sich fängt, oft aber geht er auch schon am ersten Tage in die Falle. Die Malaien behaupten, er umschleiche dieselbe einen ganzen Monat lang, ehe seine Raubgier über seine Vorsicht den Sieg davontrage. Etwas Wahres ist entschieden daran, wie ich selbst mehrere Male erfahren habe, dies lässt sich aber meines Erachtens recht gut auch damit erklären, dass sich der Geruch des Menschen an der neuerrichteten Falle erst nach einer oder mehreren Wochen verliert. Einst hatte der Tiger auf der Pflanzung Pattumbah, in Deli, einen Kling-Kuli fortgetragen, wahrend derselbe des Nachts abseits seiner Hutte, aber von einem Kameraden mit Fackel begleitet, sich eines gewissen

Bedarfnisses halber hingesetzt hatte. Auf das Hilfegeschrei verfolgte man den Menschenranber sofort, konnte jedoch im Dunkel der Nacht nichts assrichten. Am nächsten Morgen fand sich von dem armen Teufel nur nach eine handvoll Gedärme. Nun errichteten wir auf dem Ueberfallsplätse eine Falle und banden allabendlich einen Hund hinein. Mehrere Wochen lang bekundeten jeden Morgen reichliche Fährten des Tigers, dass er die Falle umschlichen hatte, aber hinein getraute er sich trots des setten Hundes nicht, so dass wir schon sast die Hoffnung ausgaben, den schlauen, misstrauischen Burschen zu erwischen. Nun trat ein Battazuberer auf, der sich anheischig machte, den Tiger uns in den nächsten Tagen in die Falle zu liesern. Er bespuckte und bemurmelte dieselbe von allen Seiten mit Zaubersprüchen, und siehe: suns Tage später kam wirklich ein Kuli mit der Freudenbotschaft gelausen: Herr! die Falle ist zu, der Menschenfresser ist gesangen!"

Einmal in der Falle, halt sich der Tiger ganz ruhig und still, auf jede Bewegung, jede Möglichkeit zum Entweichen lauernd, so dass man fast vermuthen könnte, dieselbe sei leer, wenn nicht eben die geschlossene Fallthur das Gegentheil verriethe, und ebenso das Benehmen der Hunde. Grosse Ulmer Doggen, die wir mitnahmen, rochen den Tiger schon auf beinahe zweihundert Schritte, obwohl die Falle noch gar nicht in Sicht war, und fingen so hestig an zu zittern, dass sie ihre Beine kaum mehr trugen und sie sich alle paar Schritte aus Hintertheil setzten.

Nahert man sich der Falle zu sehr, dann belehrt ein fauchendes, dumpf grimmiges Hu! dass der Tiger einen vergeblichen Versuch gemacht hat, sich auf den Nahenden zu stürzen.

Am 8 oder 9 November 1880 wurden wir frühmorgens um fünf Uhr benachrichtigt, dass ein Tiger im nahen Busch liege und "schlafe". Wir waren natürlich rasch bei der Hand und drangen, unsern Führer an der Spitze, in das Dickicht ein. Es dauerte gar nicht lange, so erblickten wir auch, uns unhörbar heranschleichend, das gelbrothe Fell durch das dichte Gras und die Schlingpflanzen schimmern, und einige gutgezielte Schüsse bliesen ihm, falls es noch vorhanden war, das Lebenslicht aus. Doch wie erstaunten wir, als wir unsere Beute näher betrachteten! Die Kreuzwirbel nahe den Hinterbeinen waren dem Thier förmlich zermalmt, fast bis auf den Markkanal. Blut, Fleischfetzen und Knochensplitter lagen überall umher zerstreut, kurz, unsere Schüsse hatten offenbar ein sterbendes, übel zugerichtetes Thier getroffen. Nur blieb uns bis auf den heutigen Tag räthselhaft, welches Thier im Stande sein

onnte, dem Tiger diese grässlichen Wunden beizubringen. Elephant um Rhinoceros konnten wir sicher ausschliessen, da der Kampfplatz in einer so dichtverschlungenen, niederen Gebüsch lag, dass wir beim Heranschlechen oft auf Händen und Füssen durchkriechen mussten; die Anwesen heit so grosser Thiere war also ausgeschlossen. Ein Wildeber, die sich oft au Stärke, Kraft und Muth ganz gut dem Tiger an die Seite stellen dürfen, kan es ebenfalls nicht gewesen sein, denn dann wären die Wunden eher am Bauc zu suchen gewesen. Meiner Ansicht nach konnten dieselben nur von der Gebiss eines Bären oder eines andern Tigers herrühren. Ich glaube, das das Letztere eher der Fall war, und das wir hier das übrigens noch ziemlich jugendliche Opfer eines Tigerduells vor uns hatten. Die Zeit November, wurde wenigstens mit der allgemeinen Ranzzeit übereinstimmes

Beim Abbalgen bat sich unser chinesischer Oberaufseher, der die Jag mitgemacht hatte, den zweiten Halswirbel als besondere Belohnung aus Derselbe enthielte, nach seiner Mittheilung, eine grosse, kräftige Madizin, gegen welches Uebel, konnte oder wollte er uns nicht sagen. Die Schnurrhaare des Thieres, gebrannt und eingenommen, sind in der Augen aller Eingebornen im Stande, die verlorene, mannliche Kraf wieder zu verleihen, und da Impotenz ein sehr häufiges Vorkommnis ist, so muss man auf die Schnurrhaare besonders Acht haben und beim Abbalgen, wenn sich die Eingebornen herumdrängen, die Augen offen halten. Stellt man zu dem, zum Trocknen aufgehängten, Fell keiner Wächter, so ist zehn gegen eins zu wetten, dass einige Stunden nachhe sämmtliche Schnurrhaare ausgerissen und gestohlen sein werden. Die Klauen machen unverwundbar und stark.

Ein in der Falle erlegtes, männliches Exemplar wog 231 Zollpfund und hatte eine Länge von der Schnauze bis zur Schwanzwurzel von 1650 Mm. mit dem Schwanz von 2155 Mm. Die Höhe des Vorderbeines von de Sohle bis zur Schulterblattspitze betrug 910 Mm, die des Hinterbeine 755 Mm. Die Kopflänge betrug 362 Mm., der Bauchumfang 1140 Mm.

Die Stimme des Tigers in der Paarungszeit ist ein dumpfes, brullendes "Ha-ub". Ich habe dasselbe nur einmal, aber dicht vor meinen Fenstern vernommen, wo sich in den Stunden zwischen 2 und 4 Uhr der Morgens ein solch minnender Kater unter beständigem "Ha-ub"-Gebrull, dass allen Schlaf verscheuchte, herumtrieb.

Als Curiosität will ich auch das Factum vermelden, dass an meinem früheren Wohnort Tandjong-Morawa, in Serdang, einmal zwei halbwüchsige Tiger zu gleicher Zeit in einer Falle sich fingen. Die Eltern warez einige Wochen vorher gefangen worden, und die zwei verwaisten jungen

There, welche wahrscheinlich noch nicht erfahren genug waren, um selbst zu jagen, trieben sich nun, allnachtlich grauenhaft brullend, immer in der Nähe der Falle umher, welche sie ihrer Eltern beraubt hatte. Nachdem dieselbe wieder in Stand gesetzt und gerichtet war, fingen sich, wie gesagt, beide Jungen zu gleicher Zeit. Das Erstaunen, statt eines Tigers, deren zwei in der Falle zu finden, kann man sich denken!

Zum Schluss gestatte man mir, den Originalbericht eines "Tabaks-Assisten" an seinen Administrateur, betreffs des Wegschleppens eines Kulidurch den Tiger, hieherzusetzen:

"Der Kuli Lim Ah Cheek ist circa 1/4 vor 6 Uhr (Morgens) vom Tiger geholt worden. (Die Malaien) Ulong, Kassip, etwa 30 Kuli's und ich sind der Spuren nachgegangen, zuerst mit grossem Geschrei, wodurch der Tiger wahrscheinlich einigemale verscheucht wurde und seine Beute weiter geschleppt hat, dann leise, und liess uns der Tiger etwa auf 15 Schritte herankommen, worauf er, den Mann im Stich lassend, entfloh. Ulong hatte einen alten Karabiner, schoss aber nicht. Dann haben wir Lim Ah Cheek begraben..... Bauch und Brust waren ziemlich zernissen, auch fanden wir auf der Spur schon ein Stück Eingeweide. Der arme Kerl hatte schon 17000 (Tabakspflanzen) ausgepflanzt und wollte heute Morgen den gestern gepflanzten Tabak zudecken, wobei ihn der Tiger überraschte.

Felis pardus Linné, var. melas.

Der schwarze Panther, mal. Rimau Kembang, ist von mir selbst nicht, dagegen wohl von einem meiner Bekannten begegnet worden; ebenso muss ich aus den Erzahlungen mehrerer Pflanzer schliessen, dass auch der wirkliche Panther schon gesehen und gefangen wurde. Wenn sich aber dessen Vorkommen wirklich bestätigen sollte, so ist dies jedenfalls ein sehr seltenes Thier.

Felis macrocelis Temminck.

Mal. Rimau akar (Rimau = Tiger, akar = Wurzel), bislang nur von Borneo und Sumatra bekannt. Ebenfalls selten, aber von mir doch in einigen Exemplaren gesehen. Ein solches Thier haben einst die chinesischen Kuli's unserer Tabakspflanzung in Serdang, in den Tabaksfeldern mit der Hacke erschlagen. Es scheint also wirklich etwas Wahres an der Behauptung zu sein, dass der Rimau akar ein gutmuthiges, nicht angriffslustiges Thier ist. Ein junges Thier hielt ich

einige Zeit lebend; es knurrte und fauchte jedoch beständig, verkroch sich in den dunkelsten Winkel seines Käfigs und liess hingestellte Näpfi mit Milch unberührt, ebenso Fleisch, wofür es wahrscheinlich noch zu jung war. Da ich ihm keine Säugemutter verschaffen konnte, so ging da arme Thier schon nach etwa acht Tagen zu Grunde.

Maasse des in den Tabaksfeldern erschlagenen weiblichen Thieres:

Lange			1500	$\mathbf{Mm}.$
19	des	Schwanzes	78o	1)
"	1)	Kopfes	180	"
"	der	Vorderbeine	430	"
"	"	Hinterbeine	430	"
Brustu	mfan	g	300	"
Bauch	umfa	ng	340	"
Breite	und	Lange der Sohlen, je	5	"

Felis planiceps Vigors und Horsfield.

Ist ebenfalls nur von Malacca, Sumatra und Borneo bekannt. Diese Thier war nicht besonders selten; ich erhielt einige Exemplare.

Maasse eines mannlichen Thieres:

Ganze Lange	555	Mm.
Rumpflange	250	"
Kopflänge	107	"
Schwanzlange	145	"
Lange der Vord	erbeine 245	••
" " Hint	erbeine 250	12
Brustumfang	60	29

Felis minuta Temminck.

Dieses schöne Kätzchen ist das häufigste von allen und ward mit oft gebracht. Der Wurf scheint stets nur aus zwei Stück zu bestehen wenigstens erhielt ich mehrere Male je zwei Stück jämmerlich miauende Säuglinge, die jedoch ungemein wild waren und bissen und kratzten. Eine säugende Katze nahm sich der kleinen Gefangenen an und bemutterte sie, sodass schon am folgenden Tage alle drei friedlich beisammen im Korb lagen. Dies dauerte so etwa vierzehn Tage; aber jedesmal beim Herannahen eines Menschen führen die kleinen Wildlinge bissig und fauchend von den Zitzen der Katzenmutter auf. Eines

lag eines schönen Morgens todt im Korb, das andere war auf Nimmerwiedersehen entflohen. Auch alle andern jungen Thiere, die ich erhielt, waren so böse und bissig, dass ich an jeder Zahmung verzweifelte.

Paradoxurus musanga Gray.

Ueberal gemein, besonders um die Wohnstatten der Menschen, wo of des Nachts gerne im Mondenschein auf den Dachern spazieren geht, wie die Kater, und zur Ranzzeit auch ein ebensolches misstönendes Geschrei vollführt. Er ist ein gefürchteter Gast im Hühnerhaus, weiss aber auch gute Früchte, besonders Ananas zu schätzen. Wir haben manches Duzend gefangen, indem wir eine Falle vor einer noch am Stock befüdlichen, reifenden Ananas aufstellten. Junge Thiere werden ausserordentlich zahm — wahre Hausthiere — und sind gegen die Ratten sehr nützlich. Der Musang, wie er bei den Malaien heisst, ist über fast den ganzen Archipel verbreitet. Er kommt vor in Birma, Siam, auf der malaiischen Halbinsel, Sumatra, Borneo, Java, den Bawean-Inseln, Timor, Ceram und Sulla-Bessie.

Maasse von zwei erwachsenen, mannlichen (No I und II) und einem veiblichen Musang (No. III).

Schnauze bis Schwanzspitze	Kopflänge	Schwanzlänge	Länge des Vor- derbeines	Länge des Hin- terbeins	Ohrbogen
Nº. I. 985 Mm.	130	475	235	235	70
№. II. 1000 "	140	430	250		_
.W.Ш. 990 "	130	485	235	235	6 0

Paradoxurus leucomystax Gray.

Bekannt von Malacca, Borneo und Sumatra. Ich habe diesen Mutang niemals in der Küstenebene, dagegen häufig auf dem ganzen
nördlichen Plateau von Toba, in den Battaländern, getroffen, wo er
sich nach Aussage der Batta's, welche das Thier Bruaué 1) nennen,
hauptsächlich von den Früchten der Arengpalme (Arenga saccharifera)
nährt. Die Batta's veranstalten oft Hetzjagden auf ihn mit besonders dazu
abgerichteten Hunden. Vgl. meinen "Rapport über eine im Dezember
1883 unternommene wisschensch. Reise an den Tobahsee".

¹⁾ Wobei ich jedoch für die Richtigkeit des B, welcher vielleicht durch P zu ersetist, mit meinem süddeutschen Gehör nicht einstehen will. Vgl. die Anm. in "Midten-Samstra" Abth. Natuurlijke historie.

Arctogale stigmatica Temminck.

Da das Thier, bevor ich es auf Sumatra fand, nur von Borneo bekant war, und zu den grossen Seltenheiten zählte, so sei mir gestattet, die Maass und Beschreibung des frisch geschossenen Thieres hier wiederzugeben

Das in Frage stehende (einzige) Exemplar, ein erwachsenes Manncher ward van einem meiner Freunde auf einem grossen Feigenbaume, de an der Strasse auf der Tabakspflanzung Tandjong-Morawa, in Serdang stand, des Abends zwischen 1/26 und 6 Uhr geschossen, als es dort um herkletterte und zwar in Gesellschaft eines gleichen Thieres (des Weit chens?) und, wie mein Freund mit Bestimmtheit gesehen haben will die reifen Früchte schmauste.

Beschreibung: Sehr schlankes, schmächtiges Thier mit sehr langer Schwanz, langem Hals und dickem, länglichem Musangkopf. Farbe gelb lich-braun, mit stark grauem Anflug, welcher davon kommt, dass da einzelne Haar vor der braunen Spitze einen breiten, weissen Ring hat Der schwache, verschwommene Rückenstreif ist dunkler. Unten und an der beiden Seiten des Halses, sowie an den Schultern, ist die ganze Spitz des Haares weiss, wesshalb auch dort die Farbe ins hellgelblich-weiss spielt. Der lange, gleichmässig, ziemlich kurz behaarte Schwanz ist dun kelkaffeebraun; ebenso der Kopf bis zu den Ohren; die ganze Unterseit von der Kinnspitze an bis zum After ist hellweisslich melirt wie am Hals Ueber den Nasenrucken bis zwischen die Augen läuft ein ganz schmale verwaschener, weisslicher Streif. Die Oberseite des Fusses ist chocoladebrau die Beine sind von der Farbe des übrigen Körpers. Schnurrhaare lang schwarz, sein. Die Augen sind braun, die Lauscher lang, abgerundet, nach vorn stehend, nackt, von schwarzer Farbe; die innere Halfte der Musche fleischfarben; Nase und Fussohlen bräunlich-schwarz.

Beine kräftig, muskulös; Pranken breit, mit halb zurückziehbaren, hell hornfarbenen, scharfen, gekrümmten, langen Krallen.

м	aasse	٠.

Ganze Länge	1120	Mm.
Widerrist-Schwanzwurz.	315	"
Kopflänge	128	"
Schwanzlänge	570	"
Lange d. Vorderbeines	240	"
" " Hinterbeines	255	"
Ohrbogen	75	,,
Sohle der Vorderbeine	50	,,
" " Hinterbeine	65	"

Hemigalea derbyana Gray.

Dieses Thier, von den Malaien ebenfalls *Rimau akar* (aber wahrscheinlich nur aus Unkenntniss) genannt, war bei Tandjong-Morawa, in Serdang, nicht besonders selten. Auf Sumatra und Borneo ist sein Vorkommen constatirt, ob es sich auch in Malakka findet, ist noch nicht ganz sicher.

Ein ausgewachsenes Mannchen hatte folgende Maasse: Schnauze bis Schwanzspitze 820 Mm., Schwanzlange 350 Mm., Kopflange 120 Mm.

Enternung zwischen den Ohrmuscheln 45 Mm. Lange der Muschel 35 Mm.

Lange des Vorderbeines 230 Mm.

" " Hinterbeines 210

Brustumfang

190 ,

Bauchumfang

170 ,

Einige Junge, die ich lebend erhielt, waren sehr wild, liessen Niemand an den Käfig, ohne zu fauchen und zu knurren, und lagen etwa eine Wöche später eines Morgens todt da.

Arctictis binturong Raffles.

Der Binturong muss auf die Ostküste sehr selten sein, denn ich habe nur ein einziges Mal in den dichten Wäldern von Tanabang, in Oberserdang, gegen 8 Uhr des Morgens ein Thier langsam und bedächtig auf dem dicken Ast eines grossen Baumes entlang schleichen sehen, das ich für einen Binturong halten musste. Leider hatte ich damals kein Gewehr bei mir.

Ein Freund von mir hat in Tandjong-Morawa, Serdang, bald nach meinem Wegzug ein junges Thier erhalten, von vollständig schwarzer Farbe, des bald sehr zahm wurde und mit sich spielen liess, wie er mir schrieb.

Herpestes? javanicus Geoffroy.

Eine Herpestes-Art, wahrscheinlich H. javanicus, wird zwar nicht in Dei selbst, wohl aber nördlich davon, in Atjeh, angetroffen, wo dieselbe nach Versicherung mehrerer, dort stationirter Beamten sehr häufig sein soll und von den Eingebornen mit Vorliebe gezähmt und fast wie ein Hansthier gehalten wird. Den Malaien in Deli, welche ich darum betregte, war solch ein Thier gänzlich unbekannt.

Herpestes brachyurus Gray.

Ward mir von meinen Leuten in einem einzigen Exemplar vom Rawa-

flusse, bei Siak, gebracht, wo es die Malaien gefangen hatten. Wie m der, das Fell praparirende, Mann erzählte, verbreitete das Thier eine erschrecklichen Gestank, so dass er seine Arbeit im Freien verrichte musste. Nach Aussage der dort lebenden Malaien soll das Thier nich gar zu selten sein und bei Verfolgung oder Annaherung eines Feind eine ölartige, entsetzlich stinkende Flüssigkeit diesem entgegenspritzen deren Geruch noch tagelang an den Kleidern haftet. Auch dieses Thie war bis jetzt nur von Malakka und Borneo bekannt.

Putorius nudipes Cuvier.

Bekannt von Malakka, Borneo und Sumatra. Dieses schöne, schlankt wieselähnliche Thierchen habe ich verschiedene Male elegant, in welle förmigen, iltis- oder wieselähnlichen Sprungen durch die Gebusche schluften sehen, auch verschiedene erlegt. Sie verbreiteten einen durchdringende Mardergeruch. Ein erwachsenes Mannchen, geschossen am 28. April 1881 hatte folgende Maasse:

Ganze Länge	542	Mm.
Kopflänge	72	19
Schwanzlänge	215	"
Lange d. Vorderbeine	110	"
" " Hinterbeine	150	"
Bauchumfang	150	,,

Midaus meliceps Cuvier.

Die Malaien haben diesem Thier, ebenso wie den beiden vorigen, keine eigenen Namen beigelegt. Mein Jager erlegte ein solches Thier, das vorher niemals gesehen zu haben behauptete, mitten in einem grosse Waldsumpfe, wo sich eine ganze Colonie dieser Thiere befunden habe soll, die sich Fische (wahrscheinlich nur Regenwürmer!) zu fangen b schäftigt waren. Das abgezogene Fell des Thieres behielt noch monat lang seinen penetranten Geruch.

Cynogale bennettii Gray.

Auch dieses Thier war bisher mit Sicherheit nur von Borneo bekann Ich erhielt auf der Ostküste Sumatra's, in Serdang und Bedagei, je ei Exemplar unter dem bei dem Malaien gebrauchlichen Namen für Fisch otter, nl. Bomprang, Prang-prang oder Momprang. Das erste Exen

par hatten die Batta's in einer Schlinge gefangen, die sie im Wald an einem Sumpf gelegt hatten. Sie schlugen dasselbe, da sie sein Fleisch für ungeniessbar hielten, todt und liessen es an Ort und Stelle liegen, wo es am nächsten Tag ein Bekannter auffand und mir brachte. Leider war dasselbe schon von Gasen ziemlich aufgetrieben und das Fell für die Praparation verdorben. Die Maasse des Thieres folgen unten, doch will ich nochmals hervorheben, dass alle Theile schon etwas geschwollen waren.

Das zweite Thier ward, ebenfalls in einer Schlinge gefangen, mir lebend von einem befreundeten Pflanzer in Bedagei zugesandt. Während der zweitägigen Reise jedoch starb unglücklicherweise dasselbe, und ich erhielt nur seine, ebenfalls schon ziemlich aufgedunsene und besonders an den durch übermässiges Binden misshandelten Beinen in Fäulniss überzugehen drohende Leiche, sodass es mir nur mit äusserster Mühe gelang, das Fell noch zu retten. Dasselbe befindet sich in Leiden, ebenso wie das Scelett des vorigen.

Das Thier befand sich schon über acht Tage in Gefangenschaft und frass während der Zeit ausschliesslich Fische, frische sowohl wie getrocknete, wie der begleitende Brief mir zu wissen that. Schon am zweiten Tage seiner Gefangenschaft machte es sich über dieselben her, soll aber ungemein wild und bösartig vom ersten bis zum letzten Tage gewesen sein und beim Herannahen eines Menschen wüthend auf die Stäbe seines Kerkers losgefahren sein.

Sein Freileben ward mir von den Malaien als das einer richtigen Fischotter beschrieben und namentlich geleugnet, dass das Thier Früchte fressen und auf Bäumen umherklettern solle, wie Brehm angibt, der ibrigens auch eine herzlich schlechte, ganz unkenntliche Abbildung des Thieres gegeben hat.

Beschreibung und Maasse des ersten, eines mannlichen, fast erwachsenen Thieres, erhalten am 21. Juli 1888:

Allgemeine Farbe schwärzlichbraungrau mit weisslichem Schimmer, welcher davon herrührt, dass die Grannenhaare, im letzten Viertel vor der Spitze, breit weiss geringelt sind. Auf dem Rücken ist sowohl die Farbe dunkler, fast schwärzlich, als der weissliche Schimmer heller. Vom Hinterkopf über den Nacken zieht ein sehr verloschener, schwärzlicher Streif. Ueber jedem Auge ein verloschener schmutzig-weisslicher Fleck, auf dem eine Partie sehr langer, schwarzer Haare steht. Unterseite heller. Unterkiefergegend bis gegen die Kehle schmutzig-weiss, ebenso die Oberlippe an der Insertion der Schnurrhaare. Das Fell ist sehr dicht, mit viel Wollhaaren. Am Bauch einzelne längere, weisse Haare. Der Schwanz kurz, dicht und buschig.

Die Schnurrhaare sind ungemein lang und stark, bis 140 Mm. lang, die oberen schwarz, die unteren hellweiss. Solche Schnurrhaare finden sich noch büschelweise am ganzen Gesicht, nämlich zwei Partien zwischen Kieferwinkel und Ohr, von weisslicher Farbe; ferner ebensolche hinten in der Mitte des Unterkiefers, und über dem Auge ebensolche, aber von schwärzlicher Farbe.

Die Augen sind ziemlich nach vorn gerichtet; die Schnauze sehr lang und breit, hinter den Lippen und Schnurrhaaren dagegen auffallend stark eingeschnurt, was dem Thiere ein merkwürdiges Aussehen verleiht. Ohren kurz, klein, aufrecht nach vorn, 30 Mm. lang, schwach behaart. Otterpranken mit Schwimmhäuten und nicht zurückziehbaren Krallen.

Ringsum den After ein breiter prolapsus ani, wohl nur eine postmortale Erscheinung.

Ganze Länge	825	Mm.
Kopflänge	133	,,
Ohrbogen	85	,,
Länge des Vorderbeines	230	"
" " Hinterbeines	250	,,
Distanz der vorderen Augenwinkel	30	12
", " hinteren "	65	",

Aonyx leptonyx Horsfield.

Mal. Name wie das vorige Thier. Die Fischotter ist in Deli allerwegen selten; ich erhielt nur ein Exemplar, ein ziemlich altes Thier, und zwar lebend, das sich jedoch ausserst ungeberdig benahm und schliesslich aus Mangel an genügender Fischnahrung zu Grunde ging, da es Fleisch u. s. w. consequent verschmähte.

In Java, bei Buitenzorg, habe ich eine solche Fischotter von Javanen gezähmt gesehen, welche auf Geheiss ihres Herrn ins Wasser ging und ihm die gefangenen Fische brachte.

Maasse:	Ganze Länge	745	Mm.
	Widerrist bis Schwanzwurzel	385	,,
	Kopflänge	110	"
	Schwanzlänge	275	17
	Länge der Vorderbeine	240	"
	" " Hinterbeine	260	"
	Bauchumfang	280	"
	Ohrbogen	80	"

Ursus malayanus Raffles.

Der malaiische Bär, Bruang von den Malaien, Kibul von den Batta's genannt, ist ein häufiger und mehr als der Tiger gefürchteter Gast in den Kokosnusspflanzungen, deren Stämme er erklettert, um der zarten, jungen Herztriebe habhaft zu werden, wodurch der betreffende Stamm natürlich abstirbt, und den Eingebornen so grossen Schaden thut. Ein Banm, den der Bruang erklettert hat, trägt noch auf lange Jahre hinaus die Narben von dessen tief eingerissenen Krallen. Selbstverständlich stellt er auch den Bienenstöcken nach, doch haben sich die schlauen Thierchen meist einen so hohen, umfangreichen Baum mit aalglatter Rinde ausgesucht, dass für Meister Pets absolut keine Aussicht besteht, an den Honig zu gelangen.

Einsam und langsam wandelt der Bruang seines Weges, auch am Tage, und trifft dabei nicht selten mit dem Menschen zusammen, den er jedoch, wenn man ihn gehen lässt, nie angreift. Im Gegentheil, er zieht sich vor ihm zurück, jedoch nicht in so furchtsam-feiger Flucht, wie der Tiger, sondern sozusagen würdevoll, seiner Kraft sich bewusst und ohne sich etwas zu vergeben, aus purer Achtung und Friedensliebe, die so weit geht, dass er sich selbst, ohne in Hitze zu gerathen, eine Ladung Vogeldunst auf den Pelz brennen lässt, wie dies einer meiner Freunde getham hat, voll Aerger, dass er gerade im gegebenen Moment keine Kugelpatrone bei sich hatte.

Mir ist ebenfalls einmal ein Bär aufgestossen, als ich ohne Flinte zur Schmetterlingsjagd einen Waldweg entlang ging. Um eine Ecke biegend, prallte ich fast mit ihm zusammen; er drehte auf dem Fleck um und hef gemächlich — ich konnte seinen harten Trab noch eine Zeit lang im hallenden Walde hören — und unter ärgerlichem Hau-hau-hau, das am besten mit dem Gebell eines grossen Metzgerhundes zu vergleichen war, davon.

Jung kann man den Bruang, oft in Gefangenschaft, sowohl bei Inlandem als bei Europäern sehen. Auch ich habe mehrere längere Zeit gepflegt. Aber nur, wenn sie noch ganz klein und jung sind, machen sei einem wirkliche Freude. Die meinigen liefen mir wie junge Hunde überall hin nach, waren jedoch sehr neugierig, untersuchten und beschnüffelten Alles, ohne auf meinen Ruf zu hören, wenn ich weiter gehen wollte, sodass sie mich oft verloren. In einem finstern Gelass eingesperrt, verschliefen sie fast die ganze Zeit, bis ich sie zum Spielen und Spazierengehen

herausliess. Reis, Milch und Fruchte waren ihre Nahrung. Wie sie grösser wurden und ihre Zähne im Munde fühlten, knabberten sie empfindlich an der mit ihnen spielenden Hand und machten ganz entschiedene Versuche, dieselbe klein zu bekommen und ihrem Magen einzuverleiben, sodass es später nicht mehr gerathen war, sie beim Spielen anzufassen. Doch waren sie nicht böse oder tückisch, sondern bissen nur aus Dummheit und Unverstand. Auf meinen Ruf hörten sie späterhin auch nicht mehr, sondern liefen, wenn man sie herausliess, hin, wo es ihnen gut dunkte, doch niemals weit weg.

Leute, welche sich viel mit ganz jungen Thieren abgeben und sie bei sich im Hause, ja oft sogar im Bette haben, wie z. B. die eingebornen Haushalterinnen, die sogenannten Njais, bekommen sie oft sehr zahm, sodass sie auf einen Ruf aus dem hintersten Zimmer herbeieilen, sich gerne liebkosen lassen, Zartlichkeiten erwiedern, kurz sich wie ein wohlgesitteter, junger Hund betragen. Gegen fremdem Besuch verhalten sie sich immer scheu, sogar bösartig, und kein Fremder darf wagen sie zu berühren. Mit der Zeit, nach einem Jahr etwa oder mehr, hört aber alle die zuthuliche Gutmuthigkeit auf, selbst wenn sie noch so zahm waren; ich habe dies nun schon bei etwa sechs Thieren beobachtet. Es tritt dann wohl keine Bösartigkeit, aber allmählich vollkommene Gleichgültigkeit gegen ihren Herrn und bisherige Heimath ein; sie schätzen beide nur noch, insofern sie gefüttert werden, und fangen an selbständig ihre Wege zu gehen, bis sie vielleicht eines schönen Tages ganz fortbleiben. Ein Bekannter von mir hielt ein junges Thier über ein Jahr lang in seinem Hause; es war zahm wie ein Hund und erlaubte sogar Fremden mit ihm zu Spielen. Dieser Zustand anderte sich im zweiten Jahr langsam: Petz begann, seine Ausfluge bis in den nahen Wald zu unternehmen, fing an, auf Tische und Stuhle, selbst an den Bettstätten empor zu klettern; wollte sein Herr ihn strasen, so zeigte er ihm auf nicht zu misskennende Weise die Zähne, und liess sich zuletzt nicht die geringste Strafe mehr gefallen, sodass selbst sein Herr verschiedene Male vor ihm fluchten musste, kurz, er betrug sich, als ob das ganze Haus ihm allein gehöre und sein Herr war für ihn kaum mehr vorhanden. Dies wurde immer arger; als er nun auch anfing, des Nachts in die Kulihutten einzubrechen und die erschreckten Leute durch seine zudringlichen Nachforschungen nach etwas Essbarem aus den Betten trieb -NB. ohne dabei jemals einem Menschen etwas zu leide zu thun -, da wurde endlich beschlossen, ihn in einen Kafig zu setzen. Dort wurde das Thier immer wilder und unzugänglicher und, das Ende vom Liede

war dass ihn sein Herr, nachdem er einmal einen tüchtigen Biss in die Hand erhalten hatte, erschoss.

Das ganze Erziehungsresultat junger Bruangs ist also nur, dass er den Menschen nicht fürchten und späterhin als ein Geschöpf, das ihm Nichts zu leide thut, in seinem Sinn verachten lernt.

Hinzusugen will ich übrigens noch, dass die Malaien zwei Arten von Bruang unterscheiden: der grösseren Art soll der weisse Kehlsleck sehlen; dieselbe soll aber sehr selten sein. Auch die Batta's sprachen von einem solchen einfarbigen Baren.

Russa equina Cuvier.

Dieser Hirsch, von der Malaien Rusa genannt, kommt auf Borneo, Banka und Sumatra vor, und ist in Deli recht häufig. Er liebt mehr sonnigen Jungwald und buschreiche Lalangsavanen als den dichten Hochwald, doch habe ich ihn auch dort getroffen. Bei Lalangbränden findet er sich in mondhellen Nächten stets ein, um die salzige Asche aufzulecken. Er hat einen durchdringenden, hellen, schrillen Schrei, so grell, dass es Einem, wenn man in der Nähe steht, durch Mark und Bein sährt; ein Herr auf unserer Pflanzung, dem, als er in finsterer Nächt nach Hause ging, ein quer über die Strasse setzender Hirsch sein grelles: Hi! plötzlich unmittelbar in die Ohren schrie, stürzte, von einer Rückenmarksapoplexie getroffen, nieder, und verschied einige Tage darauf.

Dem Hirsch wird seines Fleisches halber von jedermann nachgestellt. Von den europäischen Ansiedlern wird er geschossen, von den Malaien in grossen Rottan-Schlingen gefangen, mit denen sie ein Areal umstellen und darauf zutreiben, und von den Batta's sogar geangelt!

Jung gefangen, kann derselbe, besonders die Kuh, sehr zahm werden, sodass er aus der Hand frisst und frei umherlauft. Ich habe mehrere solcher gesehen.

Unter dem Namen Rusa terak unterscheiden die Malaien einen etwas kleineren, dunkleren Hirsch mit einfachem Stangengeweih. Ein solches Thier, dessen Schadel ich erhielt, stellte sich aber nur als einfacher "Spiesser" des vorigen heraus.

Cervulus muntjac Zimmermann.

Ueberall auf Borneo, Java und Sumatra haufig, von den Malaien in Deli Ketjang genannt, liebt das dichte Gebusch der Vorwalder und zieht weines Wissens immer einzeln herum. Ein brunstiger Bock, aber auch

eine Gais, kann oft stundenlang auf einem Fleck im dichten Busch stehen und sein fürchterliches Gebrüll loslassen, das klingt, als wenn ein Mensch mit allen Kräften und aus vollem Halse "Wä-wä-wä" schriee. Man sollte dem kleinen Hirsche eine solch laute, brüllende Stimme gar nicht zutrauen. Während dieses Geschreies scheint der Ketjang alle Vorsicht ausser Acht zu lassen, denn sobald ich oder mein Jäger dasselbe in der Nähe meines Hauses hörten, konnten wir uns ganz gemächlich fertig machen, auf die Stelle zuschleichen und erlegten regelmässig das Thier.

Tragulus kanchil Raffles und Tr. napu Cuvier.

Ersteres von den Malaien Kantjil, letzteres Blandoh oder, selten und von Fremden, Napu, von den Batta's Bluach genannt, sind in Deli häufig und werden öfters gefangen, wenn nämlich eine Ueberschwemmung eintritt, was in Deli oft sehr plötzlich geschieht. Dann werden die eleganten, leichtfüssigen Thierchen von den Wassermassen überrascht und retiriren nach einzelnen höheren Stellen, wo sie schliesslich, manchmal grosse Haufen zusammen, von der Fluth umzingelt werden und den Malaien zur leichten Beute fallen.

Auch dieses Thierchen hielt ich einige Wochen hindurch lebendig in einer geräumigen Kiste. Es blieb jedoch immer scheu und furchtsam in eine Ecke gedrückt, sobald sich Jemand nahte, und starb ohne eigentliche Ursache. Auch von andern Gefangenen habe ich nicht gehört, dass sie zahm wurden, oder nur längere Zeit am Leben blieben.

Maasse eines weiblichen, ausgewachsenen Ir. napu:

Länge	505	Mm.
Widerrist bis Schwanzwurzel	302	,,
Schwanzlänge	105	,,
Lange d. Vorderbeine	300	"
" " Hinterbeine bis zum Knie	274	,,
", ", Ohrmuschel	40	,,
Ohrbogen	65	"
Brustumfang	300	"
Bauchumfang	340	,,

Capricornis sumatrensis Shaw.

Ein Thier, welches die Malaien Kambing-utan nennen, soll in de Waldern Deli's nicht gar zu selten, aber ungemein scheu und vorsichti sein. Es soll bedeutend kleiner wie eine Ziege sein und ahnliche Hörner bestzen. Von den Batta's erhielt ich ein der genannten Antilope zugehöriges Horn unter dem Namen des Kambing-utan. Dasselbe war angeblich von ihnen im Karogebiet erlegt, doch getraue ich mir diesen Angaben nicht völlig Glauben zu schenken: denn diese Hörner können ganz gut als Tauschartikel von der Westkuste herübergekommen sein, da sie bei den Batta's als Behalter für allerlei Zaubermedizinen sehr gesucht sind. Ich bedauere lebhaft, dass ich über das Kambing-utan, dessen Name beinahe jedem Malaien von Hörensagen geläufig ist, keine Klarheit gewinnen konnte. Vielleicht ist ein Anderer glücklicher als ich.

Von Dickhautern besitzt die Ostkuste Sumatra's die erkleckliche Anzahl von vier Stuck, namlich Wildschwein, Tapir, Rhinoceros und Elephant. Wir wollen mit dem kleinsten und häufigsten zuerst beginnen.

Sus vittatus S. Muller.

Das Wald- oder Wildschwein, Mal. Babi-Utan, kommt auch auf Sumatra und Java vor und lebt in Deli in grossen Mengen, die sich, durch das Ausbreiten der Tabakskultur, welche den Hochwald vernichtet und dafür ungeheure Flachen dichten Gestrüppes schafft, nur noch vermehrt hat. Das Wildschwein, etwas schwächer als das europaische, lebt in diesen wüsten, mit Lalang und niederem Busch bestandenen Ländereien nidelweise und höhlt sich förmliche, oft eine Viertelstunde und mehr lange, verzweigte Gänge oder besser Röhren aus in dem todten Laub und Lalanggras, das in dichten Lagen, Generationen übereinander, den wirklichen Boden, oft bis zu vier Fuss Höhe, bedeckt, während die lebende Generation über diesem Moder, triumphirend, ihre grünen Fahnen schwenkt, bis auch sie in das Grab zu ihren Füssen hinabsinkt. Ich selbst bin schon einem angeschossenen Eber in einer solchen stockfinstern Röhre auf Handen und Füssen über hundert Meter weit nachgerutscht.

Das Wildschwein richtet, durch seine Wühlereien, in Pflanzungen grossen Schaden an, namentlich in den Padi(Reis-)feldern zur Zeit der Reife, iener in Pisanggärten, wo es oft in einer einzigen Nacht ganze Gruppen von mannsdicken Stämmen unterwühlt und umwirft, in Zuckerrohr- und Maispflanzungen u. s. w. In Gegenden, wo keine Pflanzungen sind, halt sich das Wildschwein mit Vorliebe an die Wurzelknollen verschiedener Kladi- (Colocasia-, Caladium-) Arten. Des eminenten Schadens halber, welchen es in den Pflanzungen der Malaien anrichtet, lauern ihm dieselben in den Padifeldern auf und schiessen es. Da ihre Religion ihnen

den Genuss von Schweinesleisch verbietet, ja selbst das Geld, welches sie durch den Verkauf des Kadavers lösen könnten, für unrein erklärt, so lassen sie ihre Beute einfach an Ort und Stelle verwesen. Höchstens lässt sich Einer herbei, einem ungläubigen, europäischen oder chinesischen Schweinesresser mitzutheilen, dass da und da ein frisch geschossenes Wildschwein liege.

Das Babi-utan ist wild und muthig und greift, schlecht angeschossen, oft den Schützen an, wie mein Jäger zu seinem Schreck erfahren hat, den ein Wildeber über den Haufen warf, mit seinem Gewaffen jedoch glücklicherweise auf den Schaft der Flinte traf und denselben nebst Hahn und Schloss völlig zerbrach und zersplitterte.

In mein Hospital erhielt ich einst einen chinesischen Kuli, dessen Schenkel durch die Bisse eines Wildschweins bös zugerichtet waren. Der Mann sass vor seinem Bibit(Tabakssaat-)Beet mit dem Ausjäten des Unkrauts beschäftigt, als plötzlich ein Wildschwein aus dem Gebüsch hervorkam und ganz ungenirt, ohne den Kuli im mindesten zu beachten, in demselben Beet zu wühlen anfing. Der Kuli, in der angenehmen Hoffnung, billig zu einem leckeren Schweinebraten zu kommen, ergreift seine Hacke und haut auf das Thier los. Das Schwein jedoch versteht die Sache falsch, packt den armen Teusel mit seinen Zahnen und richtet ihn fürchterlich zu, ja es hätte ihn unzweiselhaft getödtet, wenn auf sein Hilsegeschrei nicht die Kameraden herbeigesprungen wären und das Thier vertrieben hätten.

Dass ein Wildeber sich mit dem zahmen, überall in Deli gehaltenen, chinesischen Schwein paart, kann ich als verbürgt mittheilen. Ein Bekannter von mir, der in Serdang nur einige Minuten entfernt von meinem Hause wohnte, hielt sich ein solches zahmes Schwein, das er Rosa getauft hatte. Dasselbe lief tagsüber frei im Hofe und auch im nahen Walde umher. Eines schönes Tages nun bemerkt Herr P., so hiess mein Bekannter, dass ein galanter Wildeber die zarte Rosa mit seinen Zudringlichkeiten verfolgt. Er läuft schnell nach Hause, holt seine Buchse und, wie er zurückkommt, ertappt er das Pärchen gerade in flagranti. Flugs legt er auf den Eber an, ein Blitz und Knall — und der Eber springt unverletzt davon, die arme Rosa jedoch bricht, durch den Hals geschossen, zusammen. Man kann sich denken, wie der arme Schütze noch monatelang unter unsern Neckereien zu leiden hatte!

Die Battas halten als Hausthier ein Schwein von ausnahmslos schwärzlicher Farbe, das etwas höher auf den Beinen steht als das vorige und über den ganzen Rücken eine bedeutend grössere Mähne von langen Rossen hat. Ich habe mir leider keinen Schädel des Thieres verschaffen konnen.

Tapirus indicus Desmarest.

Der Schabrackentapir kommt auf der Ostküste in der Provinz Langkat vor, aber wie es scheint, selten. Die Malaien in Deli kennen das Thier nicht. Ich habe jedoch Pflanzer gesprochen, welche demselben wirklich begenet sind; einer bewahrt sogar den Schädel eines solchen auf, sodass an dem Vorkommen nicht mehr gezweiselt werden kann. Auch aus dem Siak'schen habe ich einige, wenngleich unverbürgtere, Nachricht über dort beobachtete Tapirs erhalten. Das Thier soll sich nur an den sumpfigsten, unzugänglichsten Stellen und nahe beim Wasser in kleinen Heerden aufhalten. Wie ich nachträglich vernahm, hat der Sultan von Serdang vor einem Jahre ein junges Thier lebend besessen, das angeblich von seinen Unterthanen (100?) gefangen war.

Ceratorhinus sumatrensis Cuvier.

Das sumatranische Rhinoceros, von den Malaien Bahdak (nicht Balsdak, wie durch einen Drucksehler in meinem Aussatz im "Ausland, 1881, zu lesen steht) genannt, kommt nur noch auf Borneo vor. Die Malaien unterscheiden übrigens von diesem Thier zwei differente Arten, eine größere, Bahdak krbo (von Karbau = Buffel), welche ziemlich fiedlich und ruhig und eine kleinere, Bahdak tingiling, welche sehr wild und bose sei und stets auf den Menschen losgehe. Ich habe immer mur Thiere einer einzigen Art erhalten. Das Rhinoceros lebt einsam oder höchstens paarweise im Waldesdickicht, von wo es, frühmorgens und Abends gegen Sonnenuntergang, in den die Waldesgrenzen umsaumenden Busch herauskommt. Wahrend der übrigen, besonders der Mittagszeit, suhlt es sich in einem verborgenen Sumps, den es regelmässig besucht. Ein Pärchen duldet etwa auf eine halbe Stunde Radius, oft sogar noch weiter, kein zweites Paar.

Im Walde tritt es sich gewisse, stets eingehaltene Hauptsahrten aus, die es nach Bedürfniss, z. B. wenn es einen andern Futterplatz aufsucht, verlegt.

Manchmal verirrt sich ein Rhinoceros bei seinen Streisereien mitten auf neuangelegte Tabakspflanzungen und benimmt sich dann, wie verwundert über die ungewohnte Lücke in seinem Wald, aber durchaus nicht scheu oder bösartig; das letztere nur, wenn es gereizt oder ausgestört wird. So war kurz vor meiner Ankunst auf der Pslanzung in Ser-

dang, wo ich als Arzt fungiren sollte, folgendes vorgekommen, wie mit die dort lebenden Herren mittheilten: Ein grosses Rhinoceros erschier plötzlich zum Staunen aller chinesischen Kulis mitten in den Tabaks feldern und drohte alle Pflanzen in Grund und Boden hinein zu stampfen Die Kulis, welche das Thier nicht kannten und für eine wilde oder wegge laufene Kuh(!) hielten, suchten dasselbe erst durch Geschrei zu verscheuchen, und als das nicht half, wollten sie ihm einen Strick um den Halt legen, um den Missethater zum Hause des Pflanzherrn zu schleppen Den Strick umzulegen, sei auch gelungen; als die Kulis jedoch anzieher wollten, schüttelte sich das Rhinoceros unwillig, sodass die Leute, die rechts und links am Seil hingen, umpurzelten, und trabte gemächlich wieder in den Wald zurück, aus dem es hervorgekommen war.

Ein anderes Thier, das, wie mir erzählt ward, ebenfalls auf seinen Abendstreiferei auf eine Tabakspflanzung herausgekommen war, blieb in dummer Verwunderung minutenlang frank und frei auf der Strasse vor einem Assistentenhaus stehen und glotzte dasselbe unverwandt an, sodass der gerade auf der Veranda beim Thee sitzende Pflanzer schnell seine, leider nur mit Schrot, geladene Flinte herbeiholen und dem Unthier eins aufbrennen konnte, worauf es endlich mit einem erschrockenen Salto-mortale im Dickicht verschwand.

Nicht immer jedoch sind die Thiere so gutmuthig aufgelegt, und ich kannte einen Pflanzer, der sein Leben nur einem ausserordentlich glucklichen Schuss zu verdanken hatte. Derselbe war ganz plötzlich und ohne Ursache angegriffen worden.

Manche Batta's jagen das Thier, dessen Fleisch sie geniessen, indem sie, zu zweien oder dreien, sich an das Thier anschleichen und ihm durch einen möglichst gut gezielten Schuss einen kleinfingerdicken Eisenbolzen zwischen die Rippen jagen. Fällt es nicht durch diesen Schuss, so sucht einer hinter dasselbe zu kommen, während die Andern es von vorne beschäftigen, und haut ihm mit einem Hieb seines haarscharfen Parang die Achillessehne durch.

Auch in Deli, wie überall, gilt bei den Malaien und Batta's der Aberglaube, dass dem Horn des Rhinocerosses geheimnissvolle Kräfte innewohnen, namentlich als Präservativ gegen Vergiftung; ein solches steht desshalb hoch im Preise.

Elephas sumatranus Temminck.

Der auf der Ostküste vorkommende Elephant ist derselben Art zugehörig, welche noch auf Borneo und Ceylon vorkommt.

Freher, sogar noch Anfangs der achtziger Jahre, war der Elephant sehr haufig und kam in Heerden, bis zu funfzig Stuck und darüber, bis bemnter an die Seektiste bei Labuan vor. Jetzt ist er unmittelbar am Meere kaum mehr, oder höchstens hie und da noch versprengt, anzureffen, indem er sich zugleich mit seinem Lieblingsausenthalt, den grossen, jungfräulichen Wäldern, weit ins Innere, bis an die Berge und in die noch unberuhrten Urwälder nach Westen, zurückgezogen hat. Doch sreien Heerden noch alljährlich durchs Land. Früher geschah dies regelmassig zweimal im Jahre. Dann konnte ich dieselben jede Nacht ganz in der Nahe meines Hauses trompeten hören, ja, sie statteten uns oft geng Besuche ab, versammelten sich in einer nicht weit entfernten, kerstehenden Tabaksscheune und vergnügten sich damit, die Rüssel mm Dache herauszustrecken, die Ataps abzudecken oder einige Pfosten asszureissen. An der Kuche einer Assistentenwohnung vorbeigehend, welche etwas abseits und hinter dem Hause lag, erschreckten sie den dont schlasenden Koch zu Tode, indem sie den Laden aufhoben und, mit dem Russel suchend, über dessen Bettstatt führen. So verüben sie, man sollte fast glauben, mit Bewusstsein, tausenderlei Schabernack. Enmal weiss ich sogar, dass sich ein Elephant zwischen die vier eng gestellten Psosten eines kleinen Wachthäuschens drängte, welches sich ein Malaie in seinem Padi(Reis-)feld erbaut hatte, dasselbe durch einen Rack aus dem Boden lupfte und auf seinem Rücken, mitsammt dessen vor Angst schreiendem Bewohner, ein Stuck Weges dahintrug. Der Elephant ist ein furchtsames, friedliebendes Thier; nur vor alten, zur Brusstzeit aus der Heerde gestossenen, Mannchen, denen aus verschmähter Liebe das Herz vor Wuth kocht, sollen Alles, was ihnen auf ihren einsamen Pfaden aufstösst, blindlings über den Haufen werfen. Das st jedoch, wenn ja, nur als Ausnahme zu einer gewissen Zeit des Jahres der Fall; denn ich bin schon manchesmal einzeln herumschweifenden Elephanten begegnet und habe sie gejagt, und immer betrugen sie sich chenso furchtsam wie die andern.

Frühmorgens, noch vor vier Uhr, geht der Elephant aus, sein Morgenmahl zu suchen, und dabei bevorzugt er leider gerade die Pflanzen, welche sich der Mensch zu seinem eigenen Bedurfniss anbaut, namlich Pisangstauden und Reis. Welch entsetzliche Verwüstungen eine Heerde Elephanten in genannten Feldern anstellen kann, brauche ich wohl nicht zu beschreiben. Um sechs Uhr hat er sich meistens schon wieder in seine Walder zurückgezogen und wandert dort, als Nachtisch sich hie und da noch einen Mundvoll saftiger Baumblätter herablangend,

verdauend hin und her, und nickt schliesslich, gewöhnlich im Schatte eines Baumes und nicht selten an dessen Stamm gelehnt, im Stehe ein, wobei er jedoch beständig seine Ohren mechanisch hin und bi bewegt, der lästigen Fliegen halber. Dies Morgenschläschen dauert etwa von zehn bis zwölf Uhr. Wenn die Hitze dann aufs höchste stein zieht er sich zurück nach seinem Badeplatz, einem verborgenen, schattige Sumpf, und kühlt sich dort im Schlamm und Wasser. Um vier Uhr b in die späte Nacht hinein geht er dann wieder zum Abendmahl, zu Spiel und den verschiedenen Hochzeitsfeierlichkeiten aus. Die Junge werden von der Mutter ausserordentlich geliebt und gepflegt und bi gleiten sie folgsam überall hin; in ihrer Vertheidigung kennt die Muta keine Grenzen, wie ein Freund von mir persönlich erfahren hat. De selbe kutschirte mit einem Bekannten auf einem "Buggy" fröhlich ein einsame Waldstrasse entlang. Da sieht er auf einmal in der Ferne eine erwachsenen Elephanten dicht neben der Strasse mit etwas eifrig be schäftigt. Ganz gegen seine sonstige Gewohnheit zog sich das Thie nicht bei der Annäherung der mit der Peitsche knallenden und rufende Pflanzer in den Wald zurück, sondern trabte unerschrocken auf de nahende Gefährt los, mit drohend erhobenem Russel. Zum Umkehre war keine Zeit mehr, und so blieb den beiden Herren Nichts übrig eilig herabzuspringen und sich in dem dichten Wald zur Seite zu berge-Der Elephant begnugte sich, Pony und Buggy in den Strassengrabe zu schleudern und trabte dann wieder zurück zu seiner Beschäftigung Wie sich herausstellte, war ihm ein Junges in eine Vertiefung gefallen aus der es sich nicht herausarbeiten konnte, und die Mutter suchte nu ihrem Liebling, und zwar mit Erfolg, beizustehen. Darüber hatten die Herren überrascht.

Wegen des ausserordentlichen Schadens, den der Elephant anrichtet aber auch wegen seines gewinnbringenden Elfenbeins und von den Eurapäern um des blossen Jagdreizes willen — jeder möchte sich gern rühmen ein solches Ungethum erlegt zu haben — wird ihm eifrig nachgestellt sodass die Elephantenheerden, die heute noch in Deli vorkommen mit verschwindenden Ausnahmen, nur aus verhältnissmässig jungen Thieren bestehen. Die stärksten Zähne, welche ich bei Männchen gesehen haber waren etwa armlang und kaum faustdick. Welch alte, grosse Herren er jedoch früher da gegeben haben muss, kann man an dem riesigen Zahn sehen, den der alte Sultan von Deli dem Museum in Batavia schenkte Früher gab es in Deli eigene Elephantenjäger von Gewerbe. Zwei der selben befanden sich eine Zeit lang in meinem Dienst, und ich erhielt

durch sie über ein Dutzend Elephanten, darunter zwei junge lebend, wa denen ich später sprechen will. Ich machte in deren Gesellschaft mench' schone Jagd mit, jedoch, wie ich gleich bemerken will, immer mgincklich. Ich schoss zwar manchen an und lief oft viele Stunden ang hinter seiner blutigen Fährte her, doch gelang es mir nie einen mi den ersten Schuss zu fällen; andere meiner Bekannten hatten wieder des Riesenglück, einen Koloss auf dem Fleck mit einem Sniderrifle ster gar einer gewöhnlichen Jagdflinte hinzustrecken. Daraus kann man mehen, welchen Werth die Marchen von der Zahigkeit und Undurchkinglichkeit der Elephantenhaut haben. Die Kugel einer Buchsflinte, Caliber 12, mit welcher mein Jäger auf 10 Schritte schoss, drang auf er Stirn ein und fuhr zum Hinterkopf wieder heraus; alle die furchterichen Instrumente, Elephantenbuchsen genannt, sowie die verschiedenen ixtra-Sprengkugeln, Granaten u. s. w. sind vollkommen entbehrlich und mantz. Gut ist's jedoch, die gewöhnliche Bleikugel durch Zusatz von twas Zinn, etwa 1/4 bis höchstens 1/2, zu härten.

Ich denke, es wird nicht unwillkommen sein, wenn ich versuche, eine lephantenjagd kurz dem Auge des Lesers vorzuführen.

Es ist Morgens 6 Uhr. Ich trinke eben meinen Morgenkaffee; da ercheint ein Malaie aus dem nahen Kampong, der mir mit einem Comtiment (Tabé) vom Herrn Bürgermeister (Dato), die Nachricht überbringt, cete Nacht habe eine Elephantenheerde einen grossen Pisanggarten zhe beim Dorf verwüstet; mehrere Malaien wollten die Heerde verolgen, um ihr das Wiederkommen zu verleiden; falls ich zur Jagd Last habe, solle ich mich um acht Uhr im Kampong einfinden. Schnell beile ich diese Nachricht zwei guten Freunden mit, den Herren Adt nd Egmer, welche schon längst auf eine Elephantenjagd brennen, und Fir sind punct acht Uhr an Ort und Stelle im Malaien-Kampong. Dort ist aber kaum eine Menschenseele zu sehen; der Herr Bürgermeister st ausgegangen, sein Morgenbad zu nehmen, und von den übrigen Bewohnern guckt nur hie und da ein verschlasenes Gesicht durch die Phorspalte, verwundert über den ungeduldigen Spectakel, den wir mathen, denn wir dachten nicht anders, als dass man nur auf unsere Ankunst gewartet habe, um sosort aufzubrechen. Ich hatte desshalb sogar, m ja nicht zu spät zu kommen, meinen halbgenossenen Morgenkaffee stehen lassen. Aber da ist von Aufbruch nichts zu sehen und zu hören. Durch einige erschrockene Buben lassen wir den Herrn Dato dringend einladen, gefälligst auf der Bildfläche zu erscheinen. Er kommt denn ach wirklich langsam und würdig, mit in unsern Augen lächerlicher

Grandezza angewandelt und ist hoch verwundert, dass wir seine Ein ladung auf acht Uhr so ganz wörtlich genommen haben. Die Leuw müssen doch vorher ihren Nassi, Reis, essen, meint er. Das dumpte Stampfen des Lesung belehrt! uns, dass dieser Nassi jedoch erst noch enthülst werden muss. Nun hätten wir als Langeingesessene recht ge wissen konnen, was von malaiischer Punctlichkeit zu halten ist; da Jagdfieber jedoch liess uns darüber hinwegsehen, und wir wurder nun sehr unangenehm daran erinnert. Zehn-sage: zehn Uhr ward es bis wir endlich vollzählig beisammen waren und unsern Marsch began nen. Derselbe führte zunächst nach dem verwüsteten Pisanggarten, de wirklich erbärmlich zugerichtet war, und dann auf der breit und glat wie eine Strasse getretenen Ruckzugslinie der Heerde über ein mit nie derem Busch und Gras bewachsenes Terrain nach dem Walde. Zwe alte, erfahrene Elephantenjäger - NB. ohne Gewehr - gingen zu Aufnahme der Fährte, was allerdings kein grosses Kunststück war, vor aus, und verrichteten ihr Geschäft so schnell, dass wir kaum nachfolger konnten. Und doch mussten wir allmälich die unfehlbare Kunst und Sicherheit der Fährtensucher bewundern lernen. Denn die Elephanten heerde hielt sich nicht compact beisammen; viele Thiere schweiften hier hin und dahin ab, sodass die Fährte nur aus einem ungeheuern Durch einander von einzelnen Spuren bestand, auf welchen sich ein Unerfahrene leicht irre gelaufen hätte und schliesslich von der Hauptspur abgekommer ware, zum Mindesten jedoch grosse Umwege hatte machen müssen; wi aber gingen sicher und ohne jemals zu zaudern oder umzukehren hinte den Führern her. Ein kleiner See, der die Spuren vollständig verdeckte ward durchwatet, in so directer Richtung, dass wir am jenseitigen Ransofort wieder die alte Fährte vor Augen sahen: unsere Führer erriethe ferner aus den Fahrten nicht blos die Anzahl der Thiere, sondern auc wie viel männliche und weibliche darunter waren, und zeigten uns a einem nackten, erdigen Abhang einzelne spannentiefe Löcher, wo di männlichen Elephanten ihre Stosszähne probirt hatten; wir hätten dies Löcher bei oberflächlicher Betrachtung für einfache Wurzellöcher geha ten, aus denen die betreffende Wurzel herausgefallen war: daraus konnte wir dann selbst ganz gemächlich die Form und Grösse der Zähne bi stimmen, während wir kurz vorher noch das Erkennen solcher Details aus der Fährte allein, für eitel Aufschneiderei erklärt hatten. Kurz, unser Frührer entpuppten sich als in jeder Hinsicht vorzüglich, und es war ei Vergnügen, sich von ihnen belehren zu lassen. So wollten wir auch sobald wir den Wald betraten, unsere Gewehre laden; die Malaien bate

ms jedoch, damit in dem dichtverworrenen Gestrupp kein Ungluck ntstehe, zu warten, bis die Führer das Zeichen gaben; denn diese könner aus der Fährte ganz genau erkennen, wie weit wir noch von der leerde entfernt seien, und so liefen wir den, sammtlich mit leeren Flinm, halblaut scherzend und plaudernd etwa zwei Stunden auf der frischen Ehrte dahin. Endlich machten die Beiden vorn halt und erklärten uns, lass wir binnen zehn Minuten auf die Elephanten stossen wurden; nun ruden alle Gewehre geladen, was die Malaien unter allerlei Zauberprichen und Kugelsegen thaten, wobei sie die Kugel unten vom Kolben a längs dem Laufe hinaufführten und oben hineinfallen liessen, nachdem e sie angespuckt hatten. Ein Propf ward nicht aufgesetzt, sodass das ewehr stets aufrecht gehalten werden musste, damit die lose Kugel icht herausfalle. Dann ward uns noch der gute Rath gegeben, wenn n angeschossener Elephant auf uns loskomme, nur schnell einen Baum 1 erklettern; zu diesem Rath machten wir ein etwas bedenkliches Geicht, da es mit unser Aller Kletterkunst nicht weit her war; die Malaien lettern natürlich wie die Affen. Mäuschenstill schlichen wir dann im ansemarsch hinter den doppelt aufmerksam umherspahenden Fuhrern, e immer noch ohne Gewehr waren, einher. Und wirklich, es dauerte vam zehn Minuten, da verkundete ein leises Schnalzen mit der Zunge, ss dieselben einen Elephanten erblickt hatten. Wir schlichen eilig an re Seite, und als wir in der angedeuteten Richtung in das Waldesmkel hineinblickten, wahrhaftig, da sahen wir vor uns, halb von den sichen verdeckt, einen der grauen Kolosse, ruhig schlafend und nur e Ohren, sowie Russel und Schwanz langsam und tactmassig bewegend, ben einem grossen Baumstamme stehen. Wir feuerten à tempo, allein r im dichten Wald sich zusammenballende Rauch benahm uns alle essicht. Wir sprangen desshalb schnell seitwarts aus der Dampfwolke zans, um einige Uebersicht zu gewinnen, duckten uns jedoch eilig seer einen Stamm, denn auf die Schüsse ging rings um uns herum solch entsetzliches Getöse von brechenden Aesten, geknickten Bäuund dazwischen von vieldutzendstimmigen Angsttrompeten los, dass angst und bange wurde und wir alle drei zusammen keinen Blutsmehr im Gesicht hatten. Dazu hörten wir rechts und links die perfalligen Thiere dicht an uns vorbeigallopiren, sodass es ein wahres ck war, dass wir nicht über den Hausen gerannt wurden; ruhig zu en und zu schiessen, glaube ich, ware keiner von uns in dem Motahig gewesen. Wir waren mitten in die Heerde hinein gerathen noch funf Minuten nach den Schussen hörten wir einzelne Nachzügler vorbeitraben, ohne sie zu Gesicht zu bekommen. Unsere Schass hatten leider nicht gut getroffen, was mich nicht wunder nahm; dent sobald wir den Elephanten erblickten - es war der zweite, auf den w jagten, wie ich zu unserer Entschuldigung anführen will - konnten w uns nicht zurückhalten, sondern schossen blindlings darauf; ich z. I hätte mit dem besten Willen nicht sagen können ob uns der Elepha den Kopf oder das Hintertheil zugekehrt hatte. Er ging aber schwerwun ab, wie wir nachher fanden, obwohl auf dem Anschuss kein Blut b merkbar war; wir folgten seiner Fährte noch mindestens drei Stunde lang, ohne ihn je wieder zu Gesicht zu bekommen; die Malaien behau teten jedoch, aus den auf der Fährte gefundenen Blutspuren, er sei j den Kopf unterhalb der Stirn getroffen, und werde voraussichtlich an de Wunden verenden. Einige Tage danach bekam ich auch wirklich Nach richt, dass man ein todtes Thier dort im Walde gefunden habe, un ich beschloss, mir den Schädel zu verschaffen. Da jedoch viele Menscher kräfte dazu gehörten, den schweren Schädel einige Stunden weit durch den Wald zu schleppen, so liess ich eine Truppe Batta's rufen, welch auf unserer Pflanzung den Wald kappten, und versprach ihnen das Fleist des Elephanten, von dem sie grosse Liebhaber sind, zum Geschen wenn sie mir den Schädel zu meinem Hause schafften. Der Handel was abgeschlossen, und ich zog mit einer Schaar von mindestens hunden mit langen Messern bewaffneter, Batta's hinaus zu der Leiche, die, noc im Tode imposant und in dem dustern Schatten des Urwaldes eine doppelten Eindruck machend, bald vor unsern Blicken lag. Nun gin ein Schauspiel los, schrecklich anzusehen und jeder Beschreibung spo tend. Alle die mitgekommenen Batta's sturzten sich mit ihren blanke Messern, unter habgierigem Geschrei, auf den todten Riesen, und schni ten ihm grosse Fetzen Fleisch und Haut vom Körper, sodass derselb in kurzer Zeit nur ein zersetzter, blutiger Fleischberg war, in dem di langen Klingen der über und über mit Blut beschmierten Batta's wühltet Plötzlich ein allgemeiner Schrei; die Batta's flohen von dem Körper de Elephanten zurück, der sich plötzlich zu bewegen schien. Er hob sich vor unsern Augen höher und höher, da die Hautdecke entfernt war un keinen Widerstand mehr bot, und schliesslich platzte der Leib, indet die angesammelten Leichengase mit lautem Getöse herausfuhren und ein ganze Wagenladung von pferdemistähnlichem Magen- und Darminhal sich nach aussen entleerte - ein scheusslicher Anblick! Nun sturzten di Batta's wieder über den Körper her, eröffneten die Bauchhöhle, zerrte und schnitten die Eingeweide heraus, und krochen dann sogar in di estere hinein, sodass von aussen und innen an dem Fleisch herumgesthelt ward. Nach einer Stunde war nur noch das nachte, blutige Gerippe des majestätischen Thieres übrig; ein unbeschreiblich widerlicher Geruch erfüllte rings die Luft, und die über und über mit Blut und Koth beschmierten Batta-Scheusale, jeder einen Fleisch- oder Eingeweidelsppen in der Hand, machten sich auf den Heimweg. Voran schwankte, von zehn Männern mit Mühe getragen, der ebenfalls abgelederte und entleischte Schädel.

Elephantensleisch ist übrigens, auch für den europaischen Gaumen, ehr wohlschmeckend, besonders der Rüssel, der ungefahr wie gutes besensleisch schmeckt; ich liess mir von jedem Elephanten, den meine ager schossen, denselben mitbringen.

Merkwürdigerweise macht auf der ganzen Ostküste Sumatra's Niemand iebrauch von den Körper- und Geisteskräften dieser Thiere und die inst so pfiffigen Tabakspflanzer lassen diese grossen Arbeitskräfte unbestätt im Walde herumlaufen; ich stelle mir vor nur desshalb, weil Niesend das Einfangen und Zähmen derselben versteht; dem liesse sich ber durch Ueberführung geeigneter Leute aus Indien und Ceylon leicht bielfen. Dass der sumatranische Elephant gerade so leicht zu zähmen t wie der indische, ist, obwohl von vorsiherein fast selbstverständlich, berdies auch durch zählreiche Proben constatirt. So habe ich verschiene zahme Elephanten bei den Sultanen von Deli und Serdang geseen, die willig und gern ihrem Führer gehorchten und allerlei Arbeit trüchteten.

Ich selbst habe durch meine Jäger ebenfalls zu zwei verschiedenen eiten je ein Junges bekommen. Die Jäger trasen sie mit ihren Müttern a Wald an, schossen die Alten nieder und singen die noch ganz kleiem, kaum 3 Fuss hohen Säuglinge ein, von denen das eine im Schreck ist dem Kopf in einen Sumps rannte und stecken blieb. Unter grossem amentiren und Widerstand wurden die Ungeheuerchen jedesmal nach lause getrieben und geschoben, und ich liess ihnen unter meinem Mahlbau-)Hause einen geräumigen Stall herrichten. Die ersten Paar Täge aren sie sehr traurig, trompeteten Täg und Nacht nach der Mutter, ollten keine Nahrung annehmen und suchten jeden, der ihnen nahte, urch Brummen zu erschrecken und umzurennen. Schon nach sunst an jedoch konnte ich sie herauslassen, ohne besürchten zu müssen, dass e davonliesen; sie hatten sich völlig in ihr Schicksal ergeben, suchten gar meine Gesellschaft auf, liessen sich liebkosen und solgten mir, etwa om achten Täge an, so vollständig auf Schritt und Tritt, dass sie im-

mer dicht hinter mir drein gingen, mit dem Kopf fast meine Beine b rührend und jede von mir beschriebene Wendung gewissenhaft nachm chend. Mit einem Wort, sie hatten mich als ihre zweite Mutter betrach ten gelernt und folgten mir so ernsthaft und brav, wie sie es der wir lichen gegenüber gethan hatten. Aber ach! die Mutternahrung, die Milcl deren die kleinen braven, geduldigen Geschöpfe so dringend bedur hatten, die konnte ich ihnen nicht verschaffen! Wohl gelang es mir, ta lich einige Flaschen Kuhmilch aufzutreiben; aber was wollte dies fi einen hungrigen Elephantenmagen bedeuten! Ich suchte als Surrogi ihnen mittelst einer Bambusröhre Reiswasser mit zerquetschten Pisan einzuslössen, womit viele Malaien in Ermanglung von Muttermilch ib Kinder aufpäppeln; allein dasselbe ward nur in ganz geringen Quant täten von ihnen genommen, wenn der Hunger gar zu arg quälte. Wah lich, die armen Geschöpse jammerten mich, wie sie nach einigen We chen, zu armseligen Sceletten abgemagert, mit heiserem Schrei ihr mageren Rüsselchen mir entgegenstreckten, meine Finger zwischen di Lippen nahmen und so gierig dran saugten, dass sie dieselben beinah hinunterschluckten, und ich hatte viel darum gegeben, hatte ich ihne ihre erschossenen Mutter wieder zurückgeben können! Sie wurden imme hinfälliger und elender, bis schliesslich der Tod ihren Leiden ein End machte.

Es bedarf keiner näheren Erklärung, dass auch für die Malaien de Elephant ein Gegenstand abergläubischer Verehrung und Furcht is, wa zum Theil wohl noch auf Rechnung ihrer früheren, durch den Mube medanismus nur nothdurftig überdeckten Hinducultur zu setzen ist. Ge wisse, alte Elephanten-Eremiten sind heilig und unverletzlich. Eines schl nen Morgens entdeckte ich dicht hinter meinem Hause die frische Fährt eines solchen und beauftragte meine Jäger, die Spur einstweilen zu ver folgen, während ich noch rasch einige Herren zu der bevorstehende Jagd einladen wollte. Nachdem sich jedoch meine Leute die Fussspu angesehen, baten sie mich inständig, von der Jagd abzulassen, dem der Elephant, der hier vorübergegangen sei, den Fussstapfen nach, ei gewaltiger alter Herr, ware ein heiliges Thier, da die Seele des Gross vaters des jetzigen Dorfhäuptlings (Dato) von Tandjong-Morawa, in ilu gefahren sei. Er hiesse desshalb bei den Malaien auch nur kurzweg Date Ein verwegener Elephantenjäger von anderswoher habe einst, mit diese Umstanden unbekannt, ihn verfolgt, da er nur noch einen einzigen aber ungeheuer grossen und starken Stosszahn trug. Als der Jäger au ihn anschlug, habe der alte "Dato" warnend seinen Russel emporgeho ben; der Jager aber achtete nicht darauf und drückte ab. Da sprang das Gewehr entzwei und der verblüffte Jager, der nun erst merkte, das er ein heiliges Thier vor sich habe, konnte von Glück sagen, dass ihm weiter kein Leid widerfuhr. Meine eigenen Jager kehrten zweimal unversichteter Dinge von der Elephantenjagd heim, weil ein Elephant in dem Moment, wo sie anlegten, seinen Rüssel emporhob, ein Zeichen für sie, dass er geseit sei.

Auch von Elephanten Kirchhöfen geht die Sage. Ein solcher soll fruber in den Waldern unweit der jetzigen Tabakspflanzung Bulo-Tjina, in Langkat, existirt haben. Ein befreundeter Pflanzer, Herr Herrmann, der dort die ersten Aufnahmen machte, um die genannte Pflanzung zu eröffnen, erzählte mir von mehreren Elephanten-Sceletten, die er dort angetroffen und brachte mehrere werthvolle Stosszahne mit, die, wie der Augenschein lehrte, schon lange in Wind und Wetter dort gelegen hatten.

Wir haben nunmehr der Insectenfresser zu erwähnen; sechs Arten derselben habe ich constatiren können. Darunter sind zunächst drei der Gattung Tupaja zugehörige Arten, nämlich:

Tupaja javanica Horsfield.

Dieses Thierchen, das häufigste von allen, aber im Vergleich zu andem Thieren immerhin nicht gemein, kommt im ganzen westlichen malaischem Archipel, nl. Malakka, Sumatra, Java, Borneo und Banka vor. Es hüpft und schlüpft genau so fertig und behende einzeln oder in Paaren im Gezweige der Büsche umher, wie ein Eichhörnchen, mit denen es desshalb bei den Malaien den Namen Topai gemein hat, mit dem Zusatz Tjitjor, welcher einigermassen sein zwitscherndes Geschrei wiedergibt, das es bei seinem unablässigen Herumtreiben nicht selten hören lässt. Auf hohe Baumwipfel geht es nicht; seine Domane ist das niedere, dichtverschlungene Gebüsch, in welchem es, wie gesagt, von einem Eichhörnchen nur für ein geübtes Auge zu unterscheiden ist.

Maasse eines männlichen Thieres:

Ganze Länge	380	Mm.
Kopflange	60	"
Schwanzlänge	170	,,
Lange d. Vorderbeine	70	"
" " Hinterbeine	90	"
Brustumfang	120	"
Bauchumfang	110	"

Tupaja tana Raffles.

Erheblich seltener als das vorstehende ist *Tupaja tana*. Ich habe dieses Thier, welches auf Sumatra und Borneo beschrankt ist, nur in zwei Exemplaren, ebenfalls unter dem Namen *Topai* erhalten. Eines davon bekam ich lebend, konnte es aber nur einige Tage erhalten.

Tupaja ferruginea Raffles.

Fast ebenso selten, und nur in einzelnen Exemplaren, bemerkte ich eine Varietät, welche mein Freund Herr Jentink v. chrysura genannt hat. Sie war sofort kenntlich und von den übrigen Tupaja's grell unterschieden durch einen goldgelb gefärbten Schwanz 1). Die typische T. ferruginea habe ich nie bemerkt, die var. chrysura stellt also wohl die delische Localform des Thierchens vor, das übrigens ebenfalls über die grossen westlichen, malaiischen Inseln Sumatra, Borneo, Java, sowie auf Malakka, bis nach Tenasserim hinauf, verbreitet ist.

Ptilocercus lowii Gray.

Das Exemplar, was ich erhielt, war von einem Bekannten auf der Landstrasse mit einem Stocke erschlagen. Ich injicirte dasselbe von Maul und Anus aus mit der, damals so viel von sich reden machenden, Wickersheimerschen Flüssigkeit, von der ich mir einen Vorrath zur Probe hatte kommen lassen, und bewahrte es ganz darin auf. Die Flüssigkeit erwies sich jedoch zu meinem grossen Leidwesen als ganz unbrauchbar, das Fell und die Eingeweide verdarben, und man konnte in Leiden nur noch das Scelett retten. Es ist dies um so mehr zu bedauern, als dieses Exemplar das einzige ist, welches auf Sumatra gefunden ward (cf. Notes from the Leyden Museum, 1885, p. 37). Die übrigen Exemplare in den europäischen Museen stammen von Borneo und Banka.

Ausser dem ebenerwähnten Exemplar kam mir nur noch ein einziger zu Gesicht in Serdang, bei Tandjong-Morawa, wo auch das vorige her stammt. Dasselbe lief mit so grosser Schnelligkeit quer über meinen Weg und verschwand zwischen den Lalanggrasstengeln, dass ich — ich was überdies noch zu Pferde — nicht zu Schuss kommen konnte. Wäre ich zu Fuss gewesen, so hätte ich es vielleicht auch einholen und mit dem Stock erschlagen konnen. Da gerade auf der Stelle, wo ich das Thierchen bemerkte, eine grosse Lalangwiese mit nur ganz geringem Busch-

¹⁾ Auf Borneo kommt merkwürdigerweise eine gleichgefärbte Varietät von T. tanz vor: ef. Dr. Jentink, in Notes from the Leyden Museum, Vol. XI, p. 29.

werk sich befand, so glaube ich schliessen zu dursen, dass der Lieblingsausenthalt des eleganten Federschwanzes sich auf dem Boden befindet, dass es mithin kein ausschliessliches Kletterthier ist wie die Tupaja's.

Gymnura rafflesii Vigors und Horsfield.

Auch dieses sonderbare Thier scheint selten zu sein, denn ich erhielt ebentalls nur zwei und zwar lebendige Exemplare, die jedoch auch nur einige Tage lebten. Zie waren ziemlich träge und schwerfällig und hatten ein entschieden nächtliches Gebahren, wie sie sich denn auch stets in der dunkelsten Ecke ihres Käfigs hielten. Sie verbreiteten einen penetranten Geruch. Das Thier ist bekannt von Sumatra und Malakka.

Da es immerhin von Interesse sein mag, von solchen weniger häufigen Thieren nochmals eine genaue nach dem Leben aufgenommene Beschreibung zu geben, so mag dieselbe hier stehen:

Mannliches Thier: lange Schnauze mit vorspringender, rüsselsormiger, nachter Nase von heller Fleischsarbe; kleinen, runden Aeuglein; breiten, mittellangen, ebensalls nachten, sleischsarbenen Ohren und nachtem Rattenschwanz, dessen Wurzelhälste schwarz, die Spitzenhälste schmutzigweiss ist, und sast nachten Beinen. Die nicht zurückziehbaren Krallen mässig schars. Der Pelz ist schwarz, mit langen, steisen Borsten auf Rücken und Nacken. Der Kopf weiss, welche Farbe sich über den Nacken bis gegen den halben Rücken hin verliert. Von der Mitte der Nase geht über die Augen ein breiter, schwarzer Streif, der sich zwischen den Ohren mit dem der andern Seite vereinigt, sodass zwischen den Augen ein länglichweisser Fleck eingeschlossen ist, und als verloschener, schwarzer Streif über den Rücken nach hinten zieht.

Maasse :	Ganze Lange	553	Mm.
	Schwanzlänge	215	,,
	Kopflänge	100	"
	Lange des Russels	20	"
	Lange der Vorderbeine	150	"
	", ", Hinterbeine	160	,,
	Bauch- und Brustumfang	185	••

Sorex.

Eine kleine Spitzmaus ist ziemlich häusig. Durch Zusall kamen mir alle meine conservirten Exemplare abhanden, sodass ich nur vermuthungsweise annehmen kann, es sei dieselbe Species, *Pachyura indica*, welche auch auf der Westküste Sumatra's vorkommt.

Manis.

Eine Art, wahrscheinlich M. javanica, welches bis jetzt der einzige Repräsentant der Edentaten im indischen Archipel ist, kommt in Deli doch nicht so selten vor, wie ich in meiner früheren Publikation annahm. Sie wird von den Kulis beim Waldschlagen oder Reinigen der Felder oft entdeckt, meistens in einer breiten Astgabel eines abgestorbenen, isolirten Baumes, und seiner Unbehülflichkeit wegen regelmässig erschlagen. Das Fell erhielt ich oft, aber erst, nachdem die chinesischen Kulis das Fleisch schon verzehrt hatten. Wie mir die Batta's mittheilten, kommt das Schuppenthier auch auf der nordlichen Hochebene von Tobah vor, wo es in seinen selbst gegrabenen Erdlöchern gefangen wird.

Die Nagethiere sind sehr zahlreich. Namentlich sind es eine ganze Reihe von Eichhörnchen, welche in munterem Spiel alle Wipfel und Gipfel beleben.

Sciurus notatus Boddaert.

Das gemeinste aller Sciuri, von den Malaien Deli's Topai genannt. Der Name Badjing ist, wahrscheinlich von Java aus, importirt. Das Thierchen hat einen grossen Verbreitungskreis, von China und Nepal über Malakka, Sumatra, Borneo, Java und Celebes. Es gewährt jedem Naturfreund grosses Vergnügen, die zahlreichen Schaaren dieser munteren Thierchen, wie sie sich unter frölichem Gezirp in den Aesten der Fruchtbäume dicht von den Häusern herumjagen, einander verfolgen, ausweichen, wobei sie oft grosse Satze von einem Baumwipfel nach dem andern machen und mit Unsehlbarbeit auch den dunnsten, schwankendsten Zweig dabei erreichen und auf dem heftig auf und absedernden Aestchen so schnell und gleichgultig weiter laufen, als hätte sie der Sprung, dessen Weite oft nahezu zehnmal ihre eigene Körperlänge übertrifft, nicht die mindeste Anstrengung gekostet. Und wenn auch der Sprung einmal missglückt, so macht (das Nichts; das Eichhörnchen spreizt seine Beine aus, was ihm die grosse, faltige Haut an den Seiten in jedem Grade gestattet, und kommt so, ohne sich wehe zu thun, auf den Boden. Auf diese Art muss sich allmählich die Flughaut der Pteromys- und Sciuropterus-Arten entwickelt haben.

Jung gefangene Thierchen werden von den Malaienbuben oft gezähmt und kriechen ihnen kosend am Leibe herum.

So schön und unterhaltend jedoch auch das Spiel der *Badjings* ist, so ungern sieht man sie auf seinen Fruchtbäumen. Denn sie sind ungeheuer gefrässig; keine Frucht ist vor ihnen sicher, selbst nicht der

stachlige Durian, oder die harte, zähe Kokosnuss. In unglaublich kurzer Zeit haben sie in eine solche Nuss ein kreisrundes Loch gebissen, das ihnen hineinzuschlüpfen und das Innere leerzufressen gestattet. nichten, da ihre Anzahl in den Fruchtgärten Legion ist, unendlichen Schaden an und sind so eine wahre Landplage. Ein von reifen Früchten strotzender Baum ist in wenigen Tagen und Nachten leer gefressen, denn bis in die späte Nacht hinein treiben die quecksilbernen Nimmersatte sich herum. Wer von den europäischen Ansiedlern sich nur einige Fruchte für seinen Tisch retten will, muss zuletzt Tag und Nacht mit der Flinte Wache halten, um die frechen Rauber herabzuschiessen. Zur Zeit, wenn die Baumfrüchte, besonders die Durians, reisen, besestigen die Eingebornen in jedem Baumgipfel eine leere, alte Petroleumbachse, in welche sie einen Klöppel anbringen und eine Schnur bis zu ihrem Haus oder einem eigens erbauten Wachthäuschen ziehen. Oft laufen viele solcher Schnüre in einem Häuschen zusammen, und durch Anziehen derselben bringt der Wächter ein entsetzliches Geläut der alten Petroleumbuchsen zu Stande, welches zwar seinen Zweck betreffs der Eichhörnchen erfallt, aber die unangenehme Nebenwirkung hat, dass es einem ehrbichen Menschen, dessen Haus sich in Hörweite befindet, jede Spur von Schlaf verscheucht. Die Wirkung glaubt dann der Wächter auch noch durch ein lautes, unmelodisches Geschrei verstärken zu müssen. Und das dauert nicht blos eine oder mehrere Nächte, sondern ganze Wochen lang hindurch!

Maasse eines alten Männchens von Sciurus notatus:

Ganze Länge	410	Mm
Schwanz	220	,,
Kopflänge	60	,,
Lange der Vorderbeine	90	,,
" " Hinterbeine	110	,,
Brust- und Bauchumfan	g 110	••

Sciurus tenuis Horsfield.

Bekannt von Malakka, Sumatra und Borneo. Ich habe diese Thierchen niemals in der Nahe menschlicher Wohnungen auf Fruchtbäumen, welche mur die vorige Art als Monopol inne hat, sondern nur im Wald, und war besonders häufig in den Vorbergen, angetroffen. Unmittelbar an der Kuste habe ich sie nicht gesehen.

Maasse eines alten Mannchens von Sciurus tenuis:

Ganze Länge	215	Mm.
Schwanz	001	"
Kopfbogen	45	"
Lange der Vorderbeine	70	"
" " Hinterbeine	80	"

Sciurus prevostii Desmarest.

Die Exemplare, welche ich in Deli schoss, waren ausnahmslos von derselben Zeichnung wie Exemplare von Borneo, nml.: zweifarbig, oben glänzendschwarz, unten rostroth, während die Exemplare, welche meine Leute vom Rawaslusse, aus Siak, mitbrachten, an den Seiten, wo das Schwarze und Rothe zusammenstiess, noch einen breiten, weissen Längsstreif besassen, was ihnen ein schones, buntes Ansehen verlieh. Dieses Thierchen kennt man noch von Malakka, Banka, Billiton, Borneo, Java und Celebes. Lebensweise und Ausenthalt wie bei Sciurus tenuis.

Ein zweifarbiges, mannliches Exemplar maass:

Ganze Länge	420	Mm.		
Kopfbogen	60	"		
Schwanz	250	"		
Lange der Vorderbeine	100	"		
" " Hinterbeine	120	"		

Sciurus albiceps Desmarest.

Von dieser Art brachten mir meine Leute von Bengkalis ein Exemplar. In Deli habe ich dieses Thier nie gesehen. Ausser Sumatra kennt man es von Malakka, Borneo und Java.

Sciurus bicolor Sparrmann.

Ist das grösste aller in Deli lebenden Eichhörnchen und liebt noch weniger die Nähe des Menschen als die vorigen, doch ist es nicht selten, und man kann oft die einzeln oder höchstens paarweise lebenden Thiere an den grossen Baumstämmen in den Wäldern auf- und ablaufen sehen. Die Malaien nennen diese Art *Topai galang prahu*. Sie ist ausser Sumatra noch bekannt von Tenasserim, Malakka und Java.

Die Maasse von vier alten Mannchen betrugen:

Ganze Länge	700—850	Mm.
Widerrist-Schwanzwurzel	205—210	1)
Schwanzlänge	360-495	,,
Kopflange	7590	"
Lange der Vorderbeine	160—180	"
" " Hinterbeine	160-210	"
Brustumfang	165-220	"
Bauchumfang	180—190	"
Ohrbogen	50 —60	12

Pteromys nitidus Geoffroy.

Das fliegende Eichhorn, bekannt von Malakka, Sumatra, Java und Bomeo, welches die Malaien Kubung, mitunter auch Krubung nennen, ist nicht selten. Besonders gegen Abend kann man dasselbe, wo geeignete Baumgruppen sind, seine ziemlich unbehülfliche Thätigkeit entfalten sehen. Es hupft, mit kurzen Sätzen und häufigen Pausen, einen Baumstamm hinauf in langgezogener Schraubenwindung, breitet plötzlich seinen Fallschirm aus und steuert, halb fliegend, halb schwebend, in schiefer Richtung durch die Luft nach einem benachbarten Stamm, an dem es auch unsehlbar aber ziemlich weit unten anlangt. Dann hüpft es denselben wieder bis zu geeigneter Höhe empor, um, abermals hernieder schwebend, den nachsten Baum zu erreichen und so fort. Auf diese Weise durchwandert es an einem Abend oft eine grössere Strecke. Es kann jedoch auch ziemlich weit horizontal steuern, besonders in der Noth; ich habe es schon eine Strecke von gut fünfzig Schritten fast ganz horizontal durchsliegen sehen. Natürlich ist diese Art von Fortbewegung höchst langsam and schwerfallig und ein Kubung, welches vom Auge eines Jägers erblickt wird, muss schliesslich regelmässig ihm zur Beute fallen, wenn es sich nicht rasch im dichten Laub der höchsten Wipfel verbergen kann. Die Thiere sind aber schlau, und verstehen sehr gut den schützenden Stamm zwischen sich und den Jäger zu bringen und ungesehen auf den nachsten Baum zuzusliegen, wobei ihnen die Dunkelheit gut zu statten kommt, denn nur am späten Abend beginnt der Kubung seine Streifereien.

Thiere, die ich anschoss, stiessen nach jedem Schuss ein kurzes, heiseres Geschrei aus.

Maasse eines erwachsenen Mannchens:

Ganze Länge	900	Mm.
Kopflänge	100	,,
Schwanzlänge	470	17
Länge der Vorderbeine	220	"
" " Hinterbeine	300	,,
Bauchumfang	200	"
Ohrbogen	70	"
Klafter zwischen den Vorderbeinen	650	"

Ein junges Thierchen, das ich lebend erhielt, aber nur einige Tage mit Weissbrod und etwas Milch erhalten konnte, war, wenigstens nach der bestimmten Aussage der Malaien, ein Junges dieser Art. Die Farbe war an der Oberseite dunkelbraunlichgrau, die Haare mit langen weissen Spitzen, besonders zwischen den Ohren, auf dem Scheitel.

Von den nackten, braunlichschwarzen Ohren über die Augen und die Nasenwurzel zog ein breiter, dunkler Streif. Schnauze schwarzlich.

Die Unterseite war hellweiss mit schwach gelblichem Auflug.

Der Schwanz, lang und dicht, hatte dieselbe Farbe wie der Rücken.

Die ganze Länge betrug	400	Mm
der Schwanz	210	,,
das Vorderbein	90	,,
" Hinterbein	100	,,
der Kopfbogen	60	17
der Brustumfang	110	**

In Serdang brachte mir einst mein Jäger ein fliegendes Eichhorn, welches sowohl in Färbung als einigen sonstigen Eigenthümlichkeiten von der vorigen Art abwich. Herr Jentink, dem ich das Fell (der Schädel kam mir leider abhanden) zusandte, meint es nur für ein junges Exemplar einer dunklen Varietät der vorigen Art ansprechen zu müssen. Die Beschreibung des Thieres in meinem Jägdjournal lautet folgendermassen: geschossen am 6. October 1882:

"Unterscheidet sich von dem gewöhnlichen Pteromys nitidus:

- 1.) Durch ein völlig dunkles, fast schwarzes van Dyk-braun, mit hellerer Unterseite.
- 2.) Der Kopf ist schmaler, nicht so breit und massig wie bei *Pt. nitidus*. Schnauze und Nase bis zu den Schnurrhaaren unbehaart, fleischfarbenbraunlich, wahrend Schnauze und Nase bei *Pt. nitidus* mausgrau behaart sind.

3.) Die Ohren sind viel langer und schmaler, die Oeffnung seitwarts gerichtet, die obere Halfte sowie die Innenseite der Muschel ganz nackt, brannlich. Ausserdem ist das obere Drittel der Muschel etwas nach hinten geknickt, sodass der hintere Muschelrand einen schwach convexen Bogen beschreibt.

Bei Pt. nitidus dagegen ist die nackte Innenseite der schwarzen, kurzen, runden Muschel nach vorn gerichtet, die Ruckseite derselben mit glanzud schwarzen, längeren Haaren besetzt.

4) Das ganze Haarkleid im Allgemeinen ist viel dunner und sparlicher als bei Pt. nitidus, besonders die Unterseite.

Die Maasse sind folgende:

Ganze Lange	893	Mm.	
Kopflänge	8 0	**	
Schwanzlänge	528	,,	
Lange der Unterseite, Maul bis Anus	385	,,	
Bauchumfang	235	,,	
Lange der Vorderbeine	250	"	
" " " bis zum Ellbogen	95	,,	
" von Ellbogen bis Handwurzel	110	,,	
" der nackten Fusssohle bis zu den Krallenspitzen	50	"	
" der Hinterbeine	290	"	
" des femur	115	,,	
" der tibia	120	"	
" " nackten Sohle	60	"	
Klasterbreite zwischen den Vorderbeinen	660	,,	
" " " Hinterbeinen	600	17	
Breite der massig gespannten Flughaut an den Seiten			
des Leibes	160	"	
Ohrbogen	48	"	
Ohr bis Nasenspitze	55	,,	
Ohr bis hinterem Augenwinkel	20	"	
Vorderer Augenwinkel bis Nasenspitze	22	"	

Mir hatte dieses Thier gar nicht den Eindruck von *Pteromys nitidus* gemacht. Auch mein Jager hatte es noch nicht gesehen. Er behauptete, als er dasselbe zu Gesicht bekam, habe es gerade heftig ein schwarzes Eichhorn (wahrscheinlich *Sciurus prevostii*) versolgt.

Die oberen Schneidezahne waren klein, die unteren lang, schmal; alle kellgelblich.

In der Umgebung von Labuan an der Kuste und bis hinauf zum Kampong Mabar sehr häufig, dagegen in Serdang vollständig fehlend, ist eine Sciuropterus-Art, welche sich zu meiner Ueberraschung als vollständig neu erwies und von meinem Freunde Herrn Jentink als

Sciuropterus hageni

beschrieben ward (cf. Notes from the Leyden Museum, Vol. XI, 1889, p. 26). Dieser Sciuropterus, von den Malaien ebenfalls kubung genannt, beträgt sich in seinem Gebahren genau so wie Pteromys nitidus. Bei Labuan, besonders an den gruppenweise zusammenstehenden Durianbaumen, kann man das nette Thierchen allabendlich, sobald es dunkel werden will, seine Thätigkeit still und einsam ausüben sehen. Sein Lieblingsfutter scheinen die Kerne des Kapok- oder Baumwollenbaumes (Eriodendron anfractuosum) zu bilden. Ich habe oft noch um 10 Uhr des Nachts die Thierchen auf den Kapokbäumen vor meinem Hause beobachten können, wie sie eine der herabhängenden Fruchte sich auf den Ast herauf holten, nach Eichhörnchenart festhielten, die Schale mit einigen Bissen lösten und sich die Kerne aus den dicken Wulsten der umgebenden Baumwolle herausholten. Sie waren bei diesem Geschäft so wenig scheu, dass ich ruhig unter den Baum treten konnte, wo sie dann oft kaum drei Fuss uber meinem Kopfe sassen (NB. immer nur einzelne Thiere, ich sah sie nie in Gesellschaft!) und mir die Schalen und die Baumwolle auf den Kopf warfen. Eine zweite, ebenfalls neue Sciuropterus-Art ist:

Sciuropterus platyurus Jentink.

Das einzige Exemplar ist beschrieben in den "Notes from the Leyden Museum, 1890, Vol. XII."

Ratten sind in jedem Hause zur Unzahl vorhanden, da Katzen im Ganzen selten gehalten werden und jene auch im Gebalk des Daches nur dem Gewehr zugänglich sind.

Mus decumanus Pallas.

In Deli ist es diese Art, welche sich zum unwillkommenen Hausgenossen des Menschen macht.

Das Vorkommen von Mus alexandrinus Geoffroy kann ich nicht mit Sicherheit verbürgen.

Auch eine kleine Maus kommt vor, aber keineswegs häufig. Ich habe leider versäumt, Exemplare zu conserviren, sodass ich über die Species Nichts mittheilen kann.

Der malaiische Name für Ratten und Mause ist Tikus. Auch die Ratten und Mause sind grosse Liebhaber der Kapok-Kerne. Da man die Kapokwolle besonders gern zum Füllen von Kissen und Matratzen verwendet, so muss man mit dem Reinigen derselben von Kernen sehr gebas sein, sonst hat man die Ueberzüge binnen wenigen Tagen von Ratten durchlöchert, welche des Nachts sogar während man im Bett liegt, is den Matratzen nach den Kernen wühlen.

Rhisomys dekan Temminck.

Ein merkwurdiges Thier, ebenfalls von mir zum erstenmal auf Sumatra efinden, und ausserdem nur noch von Malakka und Borneo bekannt, st Rhisomys dekan. Dasselbe ist nicht häufig, aber auch nicht besonders ekten, denn ich erhielt mehrere Exemplare. Nach Aussage meiner maaiischen Jäger gräbt sich das Thier in der Erde Gänge nach seinem Lieblingsfutter, den Wurzeln der verschiedenen Bambusa-Arten. Eine Zeit ang horte ich des Nachts immer ein eigenthumlich helles, lautes, fast laglich klingendes Geschrei in Absatzen aus einer benachbarten, aber enseits eines Flusses mir unzugänglichen, Bambupflanzung hervorschallen. Meine Jager versicherten, dies sei die Stimme des fraglichen, in der Erde nach Bambuwurzeln grabenden Thieres. Das Gebiss derselben ist urchtbar. Einst erhielt ich zwei lebende, schmutzigweisse Junge, die ein Malaie an einem hochgelegenen Flussufer ausgegraben haben wollte. Ich sperrte sie in einen schweren, stark aus hartem Holze gefügten Kubel, da ich bange war, dass sie mir eine gewöhnliche Kiste im Nu durchbeissen wurden. Trotzdem sie nun an der glatten, concaven Innen-Bache des Kubels für ihre Zähne gewiss schwer einen Ansatzpunct fanden, waren doch die beiden nach einigen Stunden durch ein, mit grosser Kraft usgenagtes, Loch auf Nimmerwiedersehen entflohen.

Von Stachelschweinen besitzt Deli zwei Arten,

Acanthion mulleri Jentink,

our auf Sumatra und

Acanthion javanicum Cuvier,

Sumatra (Borneo?) und Java bewohnend. Ersteres heisst bei den Malaien Lanta pakul, letzteres schlechtweg Lanta. In der Lebensweise bieten, meiner Ehrfahrung nach, beide Arten keinen Unterschied dar. Sie graben besonders gern nach Knollen und Wurzeln und kommen des Nachts in die Garten, wo sie unter den Knollengewachsen oft entsetzliche Verwustungen anrichten. Namentlich haben sie es auf die kleinen, zur Zierde

angepflanzten, Aroideen (Caladium bicolor, argyrites u.a. Species) abgesehen In meinem Garten zu Mertubung, oberhalb Labuan, z. B. war es mi unmöglich diese Gewächse zu erhalten. Was ich heute pflanzte, war nach vierzehn Tagen bis drei Wochen, wenn sich die Knollen recht entwik kelt hatten, eines schönen Morgens herausgewuhlt, die Blatter abgebisser und die Knollen gefressen. Ich passte manche liebe Nacht auf die Diebe doch vergebens; sie waren viel zu schlau und liessen sich nicht übertöl peln. Die frühesten Morgenstunden, zwischen drei und vier Uhr etwa waren ihnen zum Raub die liebsten.

Meine zwei Hunde überraschten einmal ein solches Thier und bande mit ihm an, sehr zu ihrem Schaden, denn plötzlich hörte ich ein jam merliches Schmerzensgeheul und meine armen Hunde kamen hinkend und blutend aus dem Dickicht, über und über gespickt mit abgebrochenes Stacheln, welche ihnen, als sie sich unvorsichtig naherten, das erzumt Stachelschwein in den Leib gerannt hatte. Dem einen Hunde zog ich noch einige Tage nachher mehrere fingerlange Stachelbruchstücke au der Brust, die wie Dolche eingedrungen und von aussen gar nicht meh zu sehen waren. Das Fleisch der Lanta's ist sehr wohlschmeckend, ein wahrer Leckerbissen.

Ein junges, mannliches Thier der ersten Art hatte folgende Maasse:

Ganze Lange 450 Mm.

Kopflange 90 ,,

Schwanzlange 90 ,,

Brustumfang 330 ,,

Vorder- und Hinterbeine je 170 Mm. lang.

Die längsten Stacheln waren 80 ,, ,,

Nun bleiben uns nur noch die Fledermäuse zu erwähnen übrig. Da über die Lebensweise dieser Thiere mir Nichts zu sagen erübrigt, mit Ausnahme des zuletzt zu erwähnenden *Pteropus edulis*, so mag eine einfache Aufzählung der von mir beobachteten Thiere genügen. Die kleineren Arten heissen bei den Malaien *Luntir*.

Macroglossus minimus Geoffroy.

Bekannt über den ganzen malaiischen Archipel und Hinterindien vom Himalaya bis Nord- und West-Australien.

Cynopterus marginatus Geoffroy.

Ebenfalls von Bengalen und Ceylon an über fast den ganzen malaiischen Archipel verbreitet. Rhinolophus affinis Horsfield.

Mit ahnlicher Verbreitung.

Vesperus pachypus Temminck.

Bisher nur auf Java und Celebes gefunden.

Vesperugo abramus Temminck.

Sehr verbreitet von Sud-Europa an über Klein-Asien bis Japan und von Africa über Madagascar bis Australien.

Emballonura semicaudata Peale.

Bekannt von Goram, Pelew, den Neu-Hebriden, Fidji- und Schiffer-Inseln.

Nyctinomus mops Cuvier.

Eine sehr seltene und nur von Sumatra bekannte Art.

Pteropus edulis Geoffroy.

Der "fliegende Hund", von den Deli-Malaien, mit einer Metathese des sonst gebrauchlichen Kalong, "Kluang" genannt, durchzieht oft des Abends oder frühmorgens in unendlichen Schaaren die Lufte. Er ist über den ganzen malaiischen Archipel verbreitet, aber auch auf ihn beschränkt,

Sein Fleisch ist, wenn man von einem ihm anhaftenden, eigenthumlichen Geruch oder Geschmack absieht, ausgezeichnet und wird von vielen Pflanzern gerne gegessen.

Der Kluang liebt die Blüthen des Durianbaumes, Durio zibethinus, über die Maassen; wenn derselbe blüht, kann man sicher sein, diese Thiere des Abends in Schaaren herbeikommen und so eifrig von den Blüthen schmausen zu sehen, dass ein beständiger Regen abgebissener Blümenblatter zu Boden fallt. Dabei wird ein unangenehmes Gekreisch und Gequiecke vollführt, denn der Kluang ist ein bissiges, ungeselliges Thier, obwohl er stets sich in grossen Gesellschaften zusammenhalt, und er gibt viel Zank und Streit, auch Thatlichkeiten bei einem solchen Schmaus. Angeschossen fallt er unter gellendem, wüthendem Geschrei herab, und wenn man nicht schnell herzuspringt, schiebt und häkelt er sich mit Flügeln und Beinen schnell davon. Wehe der Hand, welche ihn greifen will, so lange noch ein Fünkchen seines überaus zahen

Lebens in ihm ist! So schwer auch der Kluang verwundet sein mag, wenn ihm nicht ein Flügelknochen zerschmettert ist, zieht er noch unendliche Strecken dahin und ist dem Schützen verloren.

Er ist nicht scheu, eher sogar frech, besonders an einem blühenden Durianbaum. Da konnte ich oft nacheinander viele Stücke herabschiessen, bevor sie sich von ihrer Lieblingsmahlzeit vertreiben liessen.

Ihren Schlafbaum habe ich in Deli nie ausfindig machen können. Der Richtung nach, von welcher die abendlichen Schaaren stets herkamen, müssen sich solche in der Nähe der Küste bei Serdang befinden.

Maasse eines ausgewachsenen

Mānr	chens	:				Weib	chens:
510	Mm.	Ganze	Länge	(Ko	pf-Zehenspitz <mark>e</mark> n)	540	Mm.
110	"	Kopfla	nge			100	"
1390	"	Klafter	breite			1460	• • •
70	1)	Ohrbo	gen			60	"
_		Ganze	Länge	der	Vorderbeine	720	"
		"	"	"	Hinterbeine	240	"

Sirenia und Cetacea.

Von Cetaceen kann ich sicher nur das Vorkommen eines *Delphins* (wahrscheinl. *Steno malayanus* Lesson), der mit Sicherheit an den Küsten Malakka's constatirt ist, anführen, und der von den Fischern fast täglich gefangen und auf den Markt gebracht wird.

Bezuglich des Dugong (Halicore dujong Illiger) habe ich widersprechende Nachrichten erhalten. Die Einen wollten ihn hie und da gesehen haben, die Anderen wieder nicht, sodass sein Vorkommen auf der Ostkuste Sumatra's zweiselhast bleiben muss. In Cantor's Liste ist er von den Kusten von Singapore und Malakka ausgesuhrt.

VÖGEL.

Microhierax fringillarius Drapiez.

Von den Malaien Lang b'lalang (Heuschreckenhabicht) genannt. Es scheint mir bemerkenswerth, hervorzuheben, dass auch die Malaien das kleine, eher einem Sperling als einem Habicht gleichende Thierchen als der letztern Familie zugehörig erkannt und mit dem allgemeinen Namen für Raubvögel (Lang) belegt haben. In den Nachmittags- und Abendstunden kann man das überall häufige Thierchen, oft in grosser Gesell-

schaft bis zu 12 Stück auf den kahlen Aesten eines abgestorbenen, etwas freieren Ueberblick gewährenden, mittelhohen Baumes vertheilt, sitzen sehen, von wo sie fleissig Umschau nach fliegenden Insecten halten, auf Habichtsart nach denselben stossen, um die Beute gleich zu verschlucken oder, wenn sie etwas grösser ist, nach ihrem Standort zurückzutragen. Vor dem Menschen sind sie durchaus, auch nach österem Jagen, nicht scheu und lassen ihn ungedeckt ganz nahe an ihren Baum herankommen.

Spilornis bacha Daudin.

Ist der gewöhnlichste Raubvogel in Deli. Sein Verbreitungsgebiet erstreckt sich von der Küste bis hinauf zur Hochebene von Tobah Es ist ein prächtiges, muthiges Thier, das sich, angeschossen, voll Wuth, mit blitzenden Augen und gestraubter Haube vertheidigt. Sein Geschrei ist ein langgezogenes, klagendes Külf-kí, wovon er auch bei den Batta's den Namen Kuliki führt.

Spizaetus limnaetus Horsfield.

Diese Art ist seltener, kommt aber auch durch das ganze Gebiet vor. Junge Exemplare, die mit Vogelleim von den Malaien gefangen waren, habe ich lange Zeit lebend besessen. Sie wurden ganz zahm, und sassen tagsüber ruhig und aufmerksam auf ihrer Stange. Eines der Thiere fing sich schon am zweiten Tage ein Huhn, welches ganz ruhig mit einigen Kameradinnen unter seiner, kaum vier Fuss über dem Boden befindlichen, Stange dahinwandelte, und verzehrte es ruhig und langsam, Bissen vor Bissen. Nach einigen weiteren Tagen fing er sich ein zweites Huhn, dann ein drittes, und das ware ohne Zweifel so fortgegangen, wenn ich ihn nicht aus Besorgniss für meinen Hühnerstand translocirt hätte. Diese dummen Thieren liefen trotz der bittern Erfahrungen noch täglich denselben Weg.

Am Meeresstrande kann man fruhmorgens kurz nach Sonnenaufgang so recht das Leben und Treiben der Seeadler bewundern, wie sie in Schaaren, mit lautem, misstönendem Geschrei über dem Wasser kreisen, m sich ihr Frühstück zu erhaschen. Wehe dem Fisch oder dem kleinen Wasservogel, der sich um diese Zeit an der Oberfläche zeigt; keine Schnelligteit, kein Tauchen schützt ihn; wie der Blitz schiesst der Seeadler auf ihn herab, taucht ihm nach und trägt seine zappelnde Beute festgehallt in den Fängen nach einem einsam aus dem Wasser hervorragenden Pfahl, um sie dort bedächtig und gemächlich zu verzehren. Oft jedoch nimmt er sich hiezu keine Zeit oder es mangelt auch gerade ein

guter Sitzplatz, und dann verzehrt er ruhig seine Beute fliegend in der Luft.

Haliastur indus Boddaert.

Er ist der gemeinste und frechste aller Seeraubvögel. In geradezu fabelhafter Menge findet er sich am Hafenplatz in Labuan und ist so wenig scheu, dass er zwischen den ankernden, chinesischen Tongkangs durchstreicht, um die weggeworfenen Abfalle zu erhaschen. Häufig kann man ihn auch auf den Dächern der malaiischen Hütten sitzen sehen, beinahe in Greifnähe der Bewohner und nur durch ein löcheriges Atapdach von ihnen getrennt. Er ist meines Wissens der einzige Aasjäger unter den Deli'schen Raubvögeln, und fällt den Neuankommenden, sowohl durch seine Menge als durch sein schönes Gefieder, sofort auf.

Seine Existenz ist an das Salzwasser gebunden. Um so auffallender war es mir daher, an den Ufern des im centralen Theil der Insel, 3000 Fuss über dem Meere, gelegenen Tobah-See's ein dort nistendes Pärchen dieses Vogels (bei dem Kampong Tingging) anzutreffen; ich kann wenigstens die zwei Raubvögel, welche ich leider fehlte, aber doch aus genügender Entfernung beobachten konnte, ihrer characteristischen Färbung halber, rostrothe Ober-, blendendweisse Unterseite, für nichts Anderes halten.

Ein viel grösseres, stolzeres und weniger häufiges Thier ist

Haliaëtus leucogaster Gmelin.

Auf einem isolirt stehenden, hohen, abgestorbenen Baum dicht am Flussufer, unterhalb Labuan, hatte ein Parchen dieser Vögel ein wagenradgrosses Nest aus Knuppeln und Reisern gebaut und benutzte dasselbe, so weit ich mich erinnere, schon über zehn Jahre. Während das Weibchen brütete, hielt das Mannchen auf einem nicht weit entfernten Baum Wache.

Auf den stillen, wenig befahrenen Seitenarmen des Delislussdelta's, lebt einsam und ruhig

Haliaëtus ichthyaëtus Horsfield.

Er sitzt stets sehr niedrig, kaum bis zwanzig Fuss hoch, auf frei über das Wasser hereinragenden Baumästen. Ich habe ihn niemals auf dem grossen Fluss selbst oder auf dem Meere draussen angetroffen.

Einen sehr grossen, braunen Seeadler habe ich oft gezähmt und mit gestutzen Flügeln in malaiischen Fischerdörfern, aber niemals in Freiheit gesehen. Haben uns die Seeraubvogel auf das freie, offene, von der Sonne gluhend beleuchtete Meer hinausgeführt, so müssen wir uns nun mit der Familie der Eulen in das Dunkel der Nacht, in die stillen Gassen des schlafenden Dorfes oder in die finstern Gründe des Urwaldes begeben.

Ketupa javanensis Schlegel.

In erster Linie ist die grosse Ohreule anzuführen, welche nicht gerade welten ist und von mir öfters von meinem Hausdache herabgeschossen wurde. Ausserdem habe ich noch eine ebenso grosse, schneeweisse Ohreule am Serdangflusse geschossen, welche schwarz gestrichelt und mit brauner Flugel- und Schwanzbinde geziert war. Da ich verhindert war, das Thier zu conserviren, so kann ich nicht angeben, ob es eine eigene Art, ein Albino oder, wie die Malaien behaupteten, nur das junge Thier der vorigen Art war. Von Eulen habe ich ausserdem noch bemerkt:

Ninox scutulata Raffles, Scops lempiji Horsfield, und Scops sunia Hodgson (für Sumatra neu), sowie Phodilus badius Horsfield.

Das letztere Thier scheint recht selten zu sein. Auch dem Malaien verkundigt der Kauz, wenn Jemand sterben muss, und heisst desshalb bei ihm Burung hantu, Geistervogel, oder Lang malam, Nachthabicht.

Von Papageien habe ich drei Arten zu verzeichnen, die einzigen, wie mir scheint, welche Sumatra bewohnen, denn die Sammlung Dr. Kläsi's 1) von der Westküste zeigt ebenfalls keine andern, ebenso der Katalog von Rosenberg's und der Midden-Sumatra-Expedition.

Loriculus galgulus Linné.

Das Thierchen ist keineswegs gemein und fliegt in grösseren und kleineren Schwärmen; doch sieht man auch viele einzelne Pärchen. Der malaijsche Name ist *Lissak* und *Serindit*.

Psittinus incertus Shaw.

Weniger häufig als der vorige. Ich habe ihn immer nur in Schwärmen bis zu etwa 12 Stück in den dichten Baumkronen alter Wälder gesehen. Die Malaien nennen ihn *Buling*.

Der grösste, schönste und seltenste jedoch von den dreien ist der Bayan der Malaien:

¹⁾ Cf. Contribution to the ornithology of Sumatra, by J. Büttikofer. On a collective of birds, made by Dr. C. Kläsi in the highlands of Padang. Notes from the Leyten Museum, 1887, p. 12.

Palaeornis longicauda Boddaert.

welcher auf der Westküste Sumatra's zu fehlen scheint, da ihn weder der Katalog Dr. Kläsi's, noch die Midden-Sumatra-Expedition aufführt. In Deli will man bis jetzt noch nie ein Nest dieses Vogels oder ein Ei gefunden haben, und behauptet, dass er jenseits des Meeres in Malakka brute. Ich kann mich jedoch nicht erinnern, dass ich zu irgend einer Jahreszeit den Vogel nicht beobachtet hätte. Er fliegt stets unendlich hoch, für die Vogelslinte unerreichbar, und reissend schnell in grossen Schwärmen, und ist am besten des Abends zu beobachten, wenn er hoch oben unter schrillem, langgezogenem Geschrei seinem altgewohnten Schlafplatz, gewöhnlich einem isolirten, riesig hohen Alang-Baum zufliegt. Zufällig war einmal ein solcher Schlafbaum in der Nähe meines früheren Wohnortes, Tandjong-Morawa, umgehauen worden, und es war rührend und mitleiderregend zu sehen, wie beim Dunkelwerden allmalig die Vögel in Schwärmen von hunderten herbeikamen und, ihre Schlafstätte nicht mehr findend, unter kläglichem Geschrei und in offenbarer Rathlosigkeit, pfeilschnell die leere Stätte stundenlang umschwirrten, bis tief in die Nacht hinein. Sie kamen noch mehrere Abende hintereinander zurück, bis sie zuletzt auf Nimmerwiedersehen verschwanden.

Alle diese Papageien werden von den Malaien gezähmt. Sie lernen lieblich zwitschern, der *Bayan* soll sogar einige Worte sprechen lernen können. Ein schönes Männchen desselben wird oft mit 2 Dollars bezahlt.

Auch die schöne, herrlich gefarbte Familie der Trogon's ist durch drei Arten in Deli vertreten. Diese Vögel halten sich nur im schattigen Wald auf und sind wie es scheint ziemlich trage, denn ich habe sie schon halbestundenlang auf einem Aestchen dicht niedergekauert sitzen sehen, ohne dass sich einer bewegte. Es sind einsam lebende Vögel, die nur selten sich zu Paaren vereinigen. Wenn man im Dunkel des Waldes dahingehend über sich zwischen den Blättern plötzlich die leuchtendrothe Farbe eines Trogon erblickt, glaubt man eher eine grosse Blume, als einen Vogel vor sich zu haben, zu welcher Täuschung die ausserordentliche Ruhe und das flockige Gefieder nicht wenig beitragen. Wie locker das letztere ist, wird man zu seinem Schrecken gewahr, wenn man den Vogel durch einen Schuss herabholt. Ganze Wolken der zarten, rothen Federn stäuben dabei auf, und die Haut ist so zart und dünn, und desshalb so schwer zu präpariren, wie nur eine der desshalb berüchtigten Irena-Arten.

Die gewöhnlichste, aber immerhin nicht häufige Art ist: Trogon du-

Seltener ist: Trogon diardii Temminck.

Auf meiner Reise an den Tobah-See (1881) habe ich an den Gebirgsfanken des Plateaus einen *Trogon* mit leuchtend-gelber Unterseite und braunem Rücken geschossen, den ich für:

Trogon oreskios Temminck

balte. Ich habe das Thier leider nicht zur Identificirung aufbewahren können. Irogon oreskios wird von Dr. Klasi von der Westkuste aufgeführt.

Das palaeotropische Geschlecht der Megalaemiden oder Bartvögel zählt in Deli funf Arten. Die grösste derselben,

Megalaema chrysopogon Temminck,

hängt sich oft wie ein Specht an Baumstämme und hämmert darauf los, sodass ich das Thier einige Male für einen solchen herabschoss. Da die Bartvögel Früchtefresser sind, dagegen in Baumhöhlen nisten, so vermuthe ich, dass diese Thiere mit dem Ausmeissein oder Aussuchen ihrer zukunstigen Wohnung beschästigt waren. Die Megalaema chrysopogon, welche bei den Malaien Lopang heisst, kann man am besten bei ihrem Frühstück auf einem Fruchtbaum beobachten. Diese Fruchtbaume sind gewöhnlich Feigen, Urostigma- und Ficus-Arten, die entweder selbständig zu einer bedeutenden Höhe heranwachsen oder als Schmarotzer andere hohe Waldbaume erklettern. Ein solcher Baum stand in der Nahe meiner früheren Wohnung in Tandjong-Morawa und war zweimal des Jahres mit Früchten, goldgelben, taubeneigrossen Beeren beladen. Zur Zeit der Reife nun entwickelte sich in der Krone desselben von funf Uhr Morgens ab ein wunderbares Leben und Treiben der verschiedensten Vogelgattungen, das ich ausführlicher weiter hinten bei den Tauben zu schildern gedenke. Nachdem die Schwärme der verschiedenartigen Tauben sich satt gekröpft haben und weggeflogen sind, erscheint, so etwa um 8 Uhr des Morgens, unser Vogel zu hunderten, und fällt gierig über das von den Tauben übriggelassene her.

Megalaema mystacophanos Temminck.

Besonders häufig habe ich diese Art in den Pisang- und alten Muskatnussgärten oberhalb der Hafenstadt Labuan getroffen. In Serdang habe ich kein Exemplar beobachtet. Ueberhaupt scheinen mir die verschiedenen Megalaema-Arten, je ziemlich streng abgesonderte Gebiete einzuhalten. So war auch z. B. die von den Malaien Ampok genanute

Xantholaema haemacephala Linné,

auf den abgestorbenen Bäumen der alten Tabaksfelder um meinen früheren Wohnort in Serdang in grosser Menge angesiedelt, während ich bei Labuan, in Deli, in drei Jahren nur ein einziges Thier bemerkt habe. Und entgehen kann dem Jäger dieses Thier nicht leicht, besonders des Abends von 4—6 Uhr, da es dann einsam auf einem Aste sitzend, stundenlang ein monotones, klagendes "duk-duk-duk" herflöten kann, dessen Einförmigkeit und unabgebrochene Reihenfolge einen förmlich nervös machen kann. Sein Nest hämmert sich dieses Thierchen colonienweise in einem alten Baum, oft in kaum daumendicken, abgestorbenen Zweigen aus.

Xantholaema duvaucelii Lesson.

In den Savanen der Tabakspflanzung Kumuning, in Serdang, habe ich diese Art geschossen, aber selten 1). Häufiger scheint dieses Thierchen im Sultanat Siak zu sein, denn meine Jäger haben mir vom Rawa-Fluss mehrere Exemplare gebracht.

Chotorea versicolor Raffles.

Von ebendort erhielt ich auch einige Exemplare von dieser Art, welche der seltenste von allen scheint.

Calorhamphus fuliginosus Temminck.

Ist überall häufig.

Die Spechte, von den Malaien mit dem Collectivnamen Sladok bezeichnet, sind zahlreich, durch 12 Arten, vertreten, genau dieselbe Zahl, welche Dr. Klasi's Katalog von der Westkuste beträgt. Captain H. R. Kelam ²) fand auf der Westseite der Halbinsel Malakka nur sieben Arten.

Iyngipicus auritus Eyton

habe ich in einem Exemplar vom Rawasluss (Siak) erhalten.

¹⁾ Aus der Gedärmen des einen Thieres, die durch ein Schrotkorn eröffnet waren, ringelte sich unter krampfhaften Bewegungen eine grosse *Taenia* hervor. Ich hatte leider keine Utensilien bei mir, dieselbe zu bewahren.

²⁾ Cf. die ornithologischen Scizzen von Capt. H. R. Kelham in dem "Journal of the straits branch of the Royal Asiatic Society".

Xylolepes validus Temminck.

Ist nirgends haufig, und von mir fast ausschliesslich in Waldern gefunden, wo ich ihn regelmässig in je einem Paar antraf, die ich gewöhnlich, da die Spechte insgesammt nicht im geringsten scheu sind, alle beide schiessen konnte.

Hemicercus sordidus Eyton.

War um Tandjong-Morawa, in Serdang, nicht besonders selten und nistete in ganzen Colonien, wie Xantholaema haemacephala, in den abgestorbenen Baumen der alten Tabaksfelder; ebendort logirte auch der noch haufigere

Miglyptes grammithorax Malherbe,

oft sogar auf demselben, keineswegs grossen Baum.

Lepocestes porphyromelas Boie.

Nicht haufig.

Callolophus puniceus Horsfield.

Etwas hanfiger.

Callolophus mentalis Temminck.

Ziemlich selten.

Callolophus malaccensis Latham.

Ebenso.

Tiga javanensis Ljungh.

Ein auf der ganzen Ostküste überall gemeines Thier, von den Rhizophorenwaldern der Meeresküste an bis hinauf zu dem Plateau van Tobah. Sie fliegen gewöhnlich paarweise von einem Baum zum andern. Schiesst man ein Thier weg, so geberdet sich das andere ganz verzweiselt, stürzt auf seinen herabsallenden Genossen zu, sucht ihn zu halten, und weicht trotz der drohenden Nähe des Menschen kaum von dessen Seite, sodass ich oft, von Mitleid mit dem offenbaren Schmerz des Ueberlebenden ergissen ward und auch seinem Leben ein Ende machte.

Wahrend ihrer Jagden vollsthren diese Thiere ein lautes, gellendes, unablassiges "Specht-Geschrei."

Tiga rafflesii Vigors.

Das Thier scheint überall selten zu sein, denn sowohl Dr. Kläsi als ich haben nur je ein Exemplar geschossen.

Micropternus brachyurus Vieillot.

Ist uberall ziemlich häufig.

Gecinus vittatus Vieillot.

Ist zwar von Raffles beschrieben als Sumatraner; doch existirten between there in den europäiischen Museen von dieser Localiu Das typische Exemplar stammt von Java. In den Buschen um Labuar besonders an Kokospalmen, häufig; in Serdang sah ich in fünf Jahrenur ein Exemplar.

Auch die Kukuke sind ausserordentlich zahlreich, 11 Arten. Im Hod wald sind sie nicht zu treffen. Ihr Aufenthalt ist in den offenern, be schigen Strecken, verlassenen Tabaksseldern, dem Gebüsch der Flussuse und den Fruchtgärten, wo sie selten frei von Baum zu Baum sliegen sondern meist in den dichtverworrensten Gebüschen und Baumkrone herumhüpfen und -schlüpfen.

Surniculus lugubris Horsfield.

Nicht häufig, im Ufergebusch des Deliflusses.

Cacomantis pravata Horsfield.

Ebenfalls nicht häufig.

Cacomantis merulina Scopoli.

In dem hohen Schilfgras und Gebüsch der Flussufer nicht selten. Ich habe das Thierchen öfters noch nach Eintritt der Dunkelheit in sonder baren Sprüngen und Tänzen unter fächerartigem Ausbreiten seines Schwan zes auf den Boden hin- und herhüpfen sehen, scheinbar ohne Zweck wenn nicht, um seine Grazie vor einem irgendwo verborgen sitzender Weibchen zu zeigen, wozu aber Zeitpunct, zwischen 7 und 8 Uhr de Abends, offenbar schlecht gewählt war.

Hierococcyx fugax Horsfield.

In dem Bambugebüsch am Flussufer nahe meinem Hause bei Labua nicht selten.

Cuculus concretus S. Muller.

Nicht häufig, an derselben Localität. Die Malaien nennen das Thie Radja wali.

Coccystes coromandus Linné.

In den Obstgarten bei Labuan (Mertubang) haufig, aber immer einsam. Das Thier ist wenig scheu und flog sehr oft auf die ganz nahe bei meimer Wohnung stehenden Papayabaume, obwohl ich ungedeckt auf meiner Veranda stand.

Rhinorta chlorophaea Raffles.

Haufig und gewöhnlich paarweise zusammen herumschlupfend. Ich choss einst einen solchen Vogel aus einer Entfernung von kaum fünfehn Schritten für ein Eichhornchen herab, so tauschend wusste derselbe das Gebahren eines solchen im Gebüsch nachzuaffen, wobei ihn sein langer Schwanz nicht wenig unterstützte.

Rhopodytes diardi Lesson.

Ueberall haufig. In den Rhizophorenwaldern des Deliflussdelta schoss ich zwei Exemplare, deren nackte Augenhaut, statt blutroth, feurig orange gefarbt war. Vielleicht, worauf auch das Gefieder schliessen liess, nur junge Thiere.

Rhamphococcyx erythrognathus Hartlaub.

Etwas weniger häufig. Die letzterwähnten drei Arten, hie und da auch noch Coccystes coromandus, heissen bei den Malaien mit einem Collectivnamen Inau-Inau.

Centrococcy x rectunguis Strickland.

Der gemeinste aller Kukuke, von den Malaien Tragop, von den europaischen Ansiedlern Lalangvogel genannt, weil er sich mit Vorliebe in den Lalangsavanen und deren Randgebüsch aufhält.

Die Stimme, nach welcher der Tragop von den Malaien seinen Namen hat, und welche er zu jeder Tageszeit hören lässt, ist eigenthumlich: ein lautes, durchdringendes, in grossen Intervallen wiederholtes gop — gop — gop, auf welches ein dreimal wiederholtes, kicherndes Krächzen folgt, das ungefähr wie ein heiseres kribitjan, kribitjan klingt.

Centropus eurycercus Hay.

Ist ziemlich selten und lebt einsam und verborgen an mehr abgelegenen Orten.

Ohne Rhinocerosvögel lässt sich eine Sumatra-Landschaft gar nicht denken und es wird wenige Europäer in Deli geben, deren Jagdlust

nicht schon ein oder mehrere dieser Vögel zum Opfer gefallen sind. Glücklicherweise ist Deli sehr reich sowohl an Individuen wie an Arten dieser merkwürdigen Familie; ich habe acht Arten daselbst erlegt, dieselbe Anzahl, und, mit einer Ausnahme, dieselben Arten, die Dr. Klasi auf der Westküste unserer Insel gesammelt hat, sodass man vermuthen darf, dass dieselben Arten über die ganze Insel gleichförmig sich verbreiten.

Anorrhinus galeritus Temminck, Anthracocercus convexus Temminck und A. malayanus Raffles.

Diese drei kleineren, ziemlich häufigen Arten begreift der Malaie unter dem Namen Klihingan. Sie leben gesellig, fliegen gewöhnlich in Schwarmen von 6-10 Stück unter lautem, krächzendem Geschrei von einem Baum zum andern und lassen sich unschwer beschleichen. Das Nest legen sie hoch oben an grossen Bäumen in einer Höhlung des Stammes an, welche sie unter Umständen kunstlich erweitern. Während das Weibchen brütet, wird von dem Männchen mit Speichel und Holzsplittern, welche von ihm oft von weit entfernten, morschen Bäumen losgehackt und zugetragen werden, wie ich selbst beobachtete, die Oeffnung der Nisthöhle beinahe ganz zugeklebt, sodass das Weibchen nicht mehr herauskann, und von dem rastlos herbeisliegenden Mannchen mit Nahrung versorgt werden muss. Die Composition, Speichel und Holzstückchen, womit das Nest verschlossen wird, wird von den Malaien sehr gesucht und als obat (Medizin) geschätzt, da dieselbe, einer kreissenden Frau auf den Bauch gebunden, eine leichte, glückliche Entbindung verursachen soll. Die Entstehung dieses Aberglaubens ist meines Erachtens leicht einzusehen; das auf seinen Eiern eingemauerte Weibchen imponirt dem Eingebornen als Typus einer guten Mutter und er sucht dieser Eigenschaft, wozu auch eine leichte, glückliche Entbindung gehört, sich ebenfalls theilhaftig zu machen durch Auflegen eines Stückchens der Substanz, womit die Einmauerung bewerkstelligt wurde. Ich will hier gleich noch hinzufügen, dass der Rhinocerosvogel bei den Batta's zu den mit übernatürlichen Kräften begabten Thieren gehört und in ihrer Religion eine gewisse Rolle spielt; ich erinnere nur an die Spiele, welche beim Tode eines Batta-Radja aufgeführt werden und wobei einer sich als Rhinocerosvogel maskirt, sowie daran, dass man am Tobah-See öfters Särge antrifft, welche in Form eines Rhinocerosvogels geschnitzt sind (cf. meine "Beiträge zur Kenntniss der Batta-Religion").

Ein häufiges Thier ist auch

Rhitidoceros undulatus Shaw,

von den Malaien Nerisa genannt. Sein Lieblingsfutter bilden die Fruchte gewisser Feigenbaume, welche auch der

Buceros rhinoceros Linné,

mal. Anggang rd oder padung, besonders gerne hat. Der letzte ist der häufigste und seines besonders grossen Hornes wegen der auffallendste aller Rhinocerosvögel in Deli. Seinen malaiischen Namen hat er von seinem Geschrei, welches etwa wie Ang-gang klingt. Als ich in Serdang noch nahe am Walde wohnte, ward ich ziemlich regelmässig um 6 Uhr des Morgens durch ein fürchterlich krächzendes, weithinschallendes "Anggang" aufgeweckt, dem bald aus der Ferne ein ähnliches antwortete. Das war das Mannchen unseres Vogels, das sein Weibchen zum Frühstück nach dem nahen Feigenbaum rief. Nachdem das grausame Frage- und Antwortgekrachz etwa eine Viertelstunde angedauert hatte, kam dasselbe näher und näher, bis endlich beide Gatten unter schwerem, lautsausendem Flügelschlag über mein Haus dahinzogen und gleich darauf mit einem lauten, behaglichen "gack" auf dem Feigenbaum einfielen. Sie hockten sich so plump auf, dass sie beinahe vornüberkippten, und durch ihr unbeholfenes Getöse die schon versammelte scheue Taubenschaar zu donnernder Flucht veranlassten. Ihre verwachsenen, kurzen Beine gestatteten ihnen nur auf den dickeren Aesten nahe dem Stamme anzusliegen, und sie mussten, um in's beerentragende Gezweige zu kommen, in kurzen, ungraziösen Sprüngen den Ast entlang hüpfen. Angeschossen, verübt der Vogel ein fürchterliches Geschrei und weiss sich mit seinem furchtbaren Schnabel tüchtig zu wehren; wehe der greifenden Hand, die ihm zu nahe kommt!

Cranorrhinus corrugatus Temminck.

Dieses Thier scheint an der Kuste viel häufiger zu sein, als im Innern des Landes, wenigstens habe ich während meines fünfjährigen Aufenthaltes in Serdang nur wenige Exemplare gesehen, während ich sie nach Verlegung meines Wohnsitzes nach der Hafenstadt Labuan regelmässig jeden Abend gegen 6 Uhr in ganzen Flugen von der Seeseite kommend, dem Innern, wo ihre Schlafbäume standen, zuziehen sah. Es war fast die einzige Art von Rhinocerosvögeln, welche man bei Labuan beobachten konnte, und sie waren sehr leicht zu schiessen, da sie, wie alle Rhinocerosvögel, einen schwerfalligen, plumpen, von einem eigenthumlich klingenden Sausen begleiteten Flug haben, und ungefähr nach

jedem Kilometer Wegstrecke einige Minuten auf passenden, hohen Baumkronen ausruhen. Diese Ruhepuncte sind genau fixirt und wenn sie nicht verscheucht werden, kann man die Vögel jeden Abend ziemlich bestimmt zu der angegebenen Stunde an diesen Baumen erwarten. Der C. corrugatus ist einer der lebhaftest gefärbten Vögel der ganzen Familie. Mit dem Tode verschwindet leider der prächtige Farbenglanz, von dem die verblichenen Museumsexemplare auch nicht annähernd einen Begriff geben können. Dieses Verschwinden der Farben bei vielen Rhinocerosvögeln schon einige Stunden nach dem Tode ist ganz eigenthumlich. Nicht blos die nackten Theile verlieren ihre Farbe, wie Schnabel, Horn, nackte Augenhaut u. s. w. - das geschieht ja auch bei andern Vögeln - sondern auch die lebhaft gelben und rothen Bänder des Federkleides selbst verandern sich in schmutziges Weiss, wie wir gleich unten sehen werden. Ich will desshalb die Farbe des lebenden Thieres hier beschreiben: Das Horn ist lebhaft roth, nach unten in orange übergehend, der Schnabel gelb und orange, das hinterste Drittel des Unterschnabels schön saftbraun, die grosse nackte Augenhaut ultramarinblau, die Iris carmoisinroth, der Kopf schwarz, Kehle und Hals goldgelb. Die letzte Schwanzhälfte ist schmutzig fleischroth und verändert sich nach dem Tode nicht.

Buceros bicornis Linné.

Auch dieses Thier zeichnet sich durch seine Farbenpracht aus. Die lebhaft gelben Binden der Flügel und des Schwanzes werden nach dem Tode schmutzigweiss, ebenso das schön ziegelroth und orange gefarbte Horn, und der getrocknete Balg lässt nicht einmal mehr ahnen, wie schön das Thier im Leben aussieht. Der B. bicornis ist weniger häufig wie die andern Arten und hält sich auch nicht in Flügen zusammen, sondern durchstreift einsam, höchstens zu zweien, die Wälder.

Wenn man in Deli des Morgens durch den langhingedehnten, prächtigen Urwald reitet, so vernimmt man hie und da eine ganz merkwurdige Stimme aus dem höchsten Gezweige. Sie beginnt ganz langsam, mit grossen Intervallen, wird allmälich immer schneller und hastiger, und endigt mit einem gellen, krampfhaften Lachen: Tökök... Tökök...
Tökök... kók... kók... kók... kok kok kokoko hahahaha! Weithin und laut schallt über die stillen Walder das sonore Tokok und das wahnwitzige Gelächter, und wer es je gehört, vergisst es so leicht nicht wieder. Das ist das Geschrei des stattlichen, aber einsam und sehr scheu nur in dichtem Hochwald lebenden

Rhinoplax vigil Forsten.

dem die Malaien hienach seinen Namen, Anggang tokok, gegeben haben. Auch dieser Vogel kam einigemale des Morgens auf den grossen Fruchtbaum bei meinem Hause in Serdang. Er ist nicht häufig. Sein Flug ist viel schwerfalliger noch als der seiner Verwandten, und die zwei langen, mittleren Schwanzfedern flattern ihm dabei wie zwei Bänder nach. Daran etkennt und unterscheidet man ihn schon von weitem. Von einem Hämmen mit seiner "Hammerstirn, womit er weittönende Schläge auf die Ranmäste führt," wie Herr Forbes erzählt, habe ich Nichts bemerkt. Ein nettes Marchen erzählen sich die Malaien von Malakka über diesen Vogel (mitgetheilt, wenn ich nicht irre, in den "Malay proverbs" in: Journal of the straits branch of the Royal Asiatic Society):

"Ein Malaie wollte sich an seiner Schwiegermutter rächen, schlich sich mit einer Axt unter ihr Haus und begann mit weithintönenden Schlägen die Pfosten desselben zu durchhauen. Den Sturz des Hauses begleitete er mit lautem Gelächter. Zur Strafe ward er in einen Vogel verwandelt und man kann nun den "tebang mentuak" oft im Dschungel eine Reihe von schafen Tönen wie Axtschläge ausstossen hören, gefolgt von einem lauten: "Ha, ha, ha."

Mit Ausnahme dieses letzterwähnten und des B. bicornis, welche ihrer Seltenheit wegen wenig gefangen werden, werden die Rhinocerosvögel oft von den Eingebornen gezähmt und in Gefangenschaft gehalten. Manche werden so weit zahm, dass man sie frei ein- und aussliegen lässt, aber niemals darf man sie streicheln oder liebkosen, da sie mit ihrem Schnabel stets bei der Hand sind und in ihrem Wesen immer etwas heimtsckisches haben. Die meisten werden jung aus dem Neste genommen und ansgezogen; alte, die man hie und da in Schlingen auf ihrem Fruchtbaum sangt, werden niemals zahm.

In lichten Waldern hört man oft plötzlich einen lauten, etwas näselnden, wie "gahkgahkgak" klingenden Ruf, der etwas an das Geschrei einer Gans erinnert. Die starke, laute Stimme lässt auf einen ziemlich grossen Vogel schliessen und man ist nicht wenig verwundert, als den Besitzer derselben, nach langem Umhersuchen mit den Augen in dem grünen Gewölbe, den schönen, aber nicht besonders grossen Bienenfresser,

Nyctiornis amicta Temminck,

kennen zu lernen, der ruhig und unbeweglich auf einem Aste über uns sitzt und von Zeit zu Zeit dieses für seine Grösse starke Geschrei ausstösst. Der Vogel ist nicht gerade häufig.

Ausser diesem habe ich noch zwei andere Bienenfresser gefunden, welche von den Malaien Bibirik genannt werden, nämlich:

Merops sumatranus Raffles,

welcher im ganzen Lande in ziemlicher Menge verbreitet ist, und zu seinem Standort gewöhnlich die in den Lalangsavanen hie und da zerstreuten, niederen Bäume wählt, von denen er in eleganten Wendungen und Schwenkungen den vorüberfliegenden Insecten nachsegelt, um stets wieder auf seinen alten Standort zurückzukehren. Er lebt gesellig. Ferner den

Merops philippinus Linné,

welchen ich nur auf den über das Wasser hereinhängenden Rhizophorenbäumen im Delta des Deliflusses, aber da in grosser Menge, gefunden habe. Dr. Kläsi hat das Thier auf der Westküste gar nicht, die Midden-Sumatra-Expedition nur in einem Exemplar (von Solok) erhalten. Cpt. Kelham erwähnt ihn als "sehr gemein in Singapore während des Nord-Ost-Musson."

Von Ziegenmelkern war ich so glücklich, den grossen, seltenen

Batrachostomus auritus Vigors,

zu erhalten, in einem von Eingebornen, ich weiss nicht mehr auf welche Weise, gefangenen aber bereits verendeten Exemplar. Man soll das Thier öfters platt angedrückt und unbeweglich auf einem Ast sitzen sehen können. War bislang noch nicht auf Sumatra gefunden.

Caprimulgus macrurus Horsfield.

Ist sehr häufig. Mit Einbruch der Dunkelheit beginnt er seine lebhafte Thätigkeit, am liebsten auf dem Boden auf freien Plätzen, z. B. am Seestrande bei Rantan-pandjang, in Serdang, oder auf Strassen und Waldblössen. Doch auch am Tage kann man ihn in sehr schattigen, einsamen Obstgärten und Grundstücken (Pfeffergärten) wahrnehmen, wo er vor dem Fusse des Wanderers plötzlich geräuschlos auffliegt und eine kurze Strecke weiter wieder einfallend, sich in dem dürren Laub auf dem Boden so gut zu verstecken weiss, dass ihn nur ein geübtes Auge noch wahrnimmt. Seine Haupttummelzeit sind aber entschieden die mondhellen Nächte. Dann setzt er sich, beinahe stets in der Nähe von Häusern, auf einen alten Pfahl oder eine Zaunlatte und singt sein Lied, welches aus der einzigen, aber mit Hast und Kraft stundenlang hervorgestossenen Silbe "Tjung" besteht, die, wie Cpt. Kelham sehr richtig bemerkt, einen metallischen Beiklang hat, wie wenn man einen Stein über das Eis hin-

wirk. Die grosse Monotonie und die lange Dauer des laut und unheimlich durch die Nacht hallenden "Tjung-tjung-tjung" sind geeignet, einen schlassen Menschen zur Verzweiflung zu bringen, um so mehr, als, wie gesagt, der Vogel seinen Standort möglichst dicht beim Hause wählt und regelmässig jede Nacht wiederkehrt.

Bei Tandjong-Morawa, in Serdang, glaube ich noch zwei andere Caprimigiden bemerkt zu haben, welche nach Einbruch des Abends über den Waldblössen kreisten, und dabei einen Ruf wie: Tü-tü-tüh (Ton auf der ersten Silbe) hören liessen. Die zweite Art schwebte ebenfalls an solchen Stellen, aber nicht vermischt mit der andern und ziemlich hoch. Ihr Ruf lautete: Tü-tü-tü, darauf eine Terz höher, wiederum: Ti-ti-ti. Von einer dieser Arten kann ich wenigstens bestimmt behaupten, dass es ein Ziegenmelker war, da ich ein Exemplar herabschoss, dessen Balg mir leider verloren ging.

Aus der Familie der Eisvögel habe ich die beträchtliche Anzahl von acht Arten zu constatiren, wie es auch bei einem so sumpfigen, wasserwichen Land nicht anders zu erwarten ist.

Pelargopsis javana Boddaert.

Der grösste und gemeinste ist diese Art. Er kommt sowohl an der Meeresküste als längs der Flüsse, ja sogar mitten im Walde vor und verrath sich meist durch sein lautes, hässlich gellendes Geschrei, das er gewöhnlich einige Zeit vor Beginn eines Flüges vollführt. Es ist gerade, als ob er aller Welt ankündigen wollte: gebt Acht, gleich werde ich fliegen! Wenn man dasselbe hört, kann man sicher sein, den Vögel hald hervorsliegen zu sehen. Trotz seiner grossen Menge, die z. B. im Delta des Delistusses unendlich ist, lebt er einsam, ich habe nie ein Pärchen beisammen gesehen. Mal. Name: Burung udang.

Alcedo bengalensis Gmelin.

An allen Gewässern, besonders aber im Deli-Delta das ganze Jahr über gemein.

Alcedo asiatica Swainson.

Ebenfalls gemein im Deli-Delta, aber nicht gern weit ins Land hinaufgehend. Es ist ein Wandervogel, der von Dezember bis Mitte April weilt. In den andern Monaten habe ich noch kein Stuck zu Gesicht bekommen. Diese beiden kleinen Arten heissen bei den Malaien: Tintin sungei.

Sauropatis chloris Boddaert.

Ein langs der ganzen Meeresküste gemeines Thier, das aber nur so weit ins Land geht, als das Brackwasser reicht. Mal.: Burung udang wie alle folgenden.

Die nachfolgenden Arten leben nicht an den Flüssen und holen sich ihre Nahrung nicht aus dem Wasser, sondern im Wald, und zwar am liebsten in den dunkelsten und feuchtesten Partien desselben, doch kanz man sie auch oft genug herausstreichend finden.

Ceyx rufidorsa Strickland.

Diese Art ist selten. Man kann das kleine Vögelchen hie und da wie einen glühenden Pfeil durch die Büsche schiessen sehen.

Halcyon coromanda Latham.

Ist ebenfalls ein seltenes Thier.

Halcyon pileata Boddaert.

Ist während der Regenzeit, Ende October bis Ende Januar, ein in allen lichten Wäldern und Gebüschen sehr häufiges Thier, das man jedoch zu einer andern Jahreszeit kaum zu Gesicht bekommt.

Halcyon pulchella Horsfield.

Ist in den Jungwäldern um Labuan nicht besonders selten, scheint aber local beschränkt zu sein. Ich schoss die meisten Exemplare im Mai.

Von Schwalben (mal. Lajang) habe ich zwei Arten bemerkt, deren eine, Hirundo gutturalis Scopoli, in den Hausern brutet. Auf den durren, aus dem Wasser hervorragenden Stecken der Fischfallen, welche die Malaien etwa einen halben bis einen Kilometer vom Lande entfernt in der seichten See anlegen, kann man haufig Hirundo rustica Linné ausruhen sehen.

Von Siak (Sungei Rawa) erhielt ich Macropteryx longipennis Rafinesque, und aus den Waldern von Serdang das seltene, schöne Thierchen Macropteryx comata Temminck.

Eurystomus orientalis Linné.

Dieser schöne, blaue Vogel ist überall sehr häufig und sitzt gewöhnlich ruhig und still in den Gipfeln der Bäume. Ihre Jagd beginnt sie erst gegen Abend. Ihr Flug ist leicht und elegant; er hat etwas segelartiges. Aus dem Magen eines solchen Thieres habe ich einmal zugleich acht kaum verletzte, grosse Wanzen (Cantao ocellata) herausgeschnitten. Während meines neunjährigen Aufenthaltes auf Sumatra und trotz eifrigsten Sammelns an jener Stelle (in der Nähe meines Hauses, wo ich auch den betreffenden Vogel schoss) habe ich nur noch ein einziges Exemplar dieses Hemipters finden können.

Die prachtige

Calyptomena viridis Raffles

habe ich öfters auf todten, isolirten Bäumen in alten Tabaksfeldern in Serdang sitzen sehen und geschossen, später auch bei Labuan, doch ist dies immer ein ziemlich seltener Vogel.

Cymborhynchus macrorhynchus Gmelin.

In Gebusch und lichtem Wald nicht selten; ein ziemlich einsamer und trager Vogel, dem die Malaien den komischen Namen Tjutjuran-utjan gegeben haben. Merkwürdig ist an dem Thier die postmortale Verfarbung seines im Leben lebhaft blauen, unten gelblichgrünen, breiten Schnabels in mattes Bleischwarz, wodurch der Vogel, dessen schönes Farbenspiel das Auge im Wald entzückt, fast bis zu Unkenntlichkeit entstellt wird.

Eurylaimus ochromelas Raffles.

Ist seltener als der vorige, und halt sich mehr in Flugen zusammen, sodass man auf einem Baum oft 10—12 Exemplare sehen kann. Auch dieser Vogel, sowie der folgende, verandern nach dem Tode die Farbe ihres Schnabels in der eben angegebenen Weise.

Eurylaimus javanicus Horsfield.

Ist ein seltenes Thier, das ich nur in wenigen Exemplaren während meines neunjährigen Aufenthaltes erhalten habe.

Corydon sumatranus Raffles.

Nirgends selten. Man kann denselben am besten bei hereinbrechendem Abend beobachten. Dann sitzt er ruhig und still auf irgend einem alten, todten Ast, und fliegt nur hie und da auf, um ein vorüberschwirrendes

Insect zu erhaschen. Der Vogel hat gewissermassen ein nachtliches Gebahren in seinem Wesen, ahnlich wie Eurystomus orientalis.

Fliegenfanger sind mir vier begegnet, namlich:

Hypothymis azurea Boddaert.

Nicht häufig.

Niltava grandis Blyth.

Von diesem Vögelchen ward mir ein Exemplar von der Hochebene von Tobah (aus dem Karogebiet) gebracht. In der Kustenebene habe ich es nie beobachtet. Captain Kelham erwähnt es auch nicht von Malakka dagegen hat Dr. Klasi dasselbe auf der Westkuste Sumatra's erbeutet.

Philentoma pyrrhopterum Temminck,

war in den Gebuschen um meinen früheren Wohnort in Serdang nicht gerade besonders selten.

Rhipidura javanica Sparrmann.

In dem Schilfgebusch des Deliflusses zwischen Medan und Labuan haufig. Ruhe- und rastlos fliegen und schlupfen die kleinen, lebhaften Thierchen zwischen den Stengeln des Schilfrohres herum, setzen sich nieder, wippen mit dem langen Schwanz, verfolgen sich und die vorbeifliegenden Insecten auf das Wasser hinaus, kurz, treiben voll Lebenslust allerhand Kurzweil.

Feuerfunken gleich, tummeln sich die kleinen Pericrocotus-Arten gesellig in den Baumwipfeln herum. In Serdang war es besonders

Pericrocotus xanthogaster Raffles,

jedoch nicht besonders häufig und mehr in den Rändern des Urwaldes, während

Pericrocotus igneus Blyth,

bei Labuan in den Fruchtbäumen, welche mein Haus umgaben, eine stereotype Erscheinung war.

Lalage terat Boddaert.

Ein, wie es scheint, einsam lebender Vogel; der keineswegs gemein war, und nur vereinzelt vorkam.

Lalage culminata Hay.

Ein ziemlich seltenes und vereinzeltes Thier.

Artamides sumatrensis S. Muller.

Auch eine ziemlich seltene Erscheinung. Mal. Seriti.

Irena crinigera Sharpe.

Ist in den Waldern Deli's ein seltenes Thier, das immer paarweise die Walder durchstreift. Ich habe in der langen Zeit meines Ausenthaltes nur zwei Paare zu Gesicht bekommen. Da der Vogel seiner leuchtend blauen Parbe halber nicht leicht übersehen werden kann, so ist dies um so ausfallender, als es an andern Localitäten geradezu gemein ist, z. B. in Penang, wo ich es selbst beobachtet habe, in Siak am Rawaslusse, wo meine Jäger in 8 Tagen fünszehn Exemplare schossen, und auf der Westküste Sumatra's, von wo der Katalog Dr. Kläsi's 42 Exemplare vermeldet.

Chaptia malayensis Hay.

Ist in lichten, buschigen Waldern nicht selten. Das Thier fliegt auch noch nach Einbruch der Dunkelheit, wenn man kaum mehr Gegenstände unterscheiden kann, besonders gern auf buschumsaumten Waldwegen ziemlich niedrig über dem Boden, jedenfalls um die zu dieser Zeit in vermehrter Anzahl erscheinenden Insecten wegzufangen.

Buchanga stigmatops Sharpe.

Ich erhielt ein Exemplar aus den Karolandern von der Hochebene von Tobah; es scheint sich über den gebirgigen Theil Sumatra's bis zur Westkuste auszubreiten, denn sowohl der Katalog der Midden-Sumatra-Expedition als Dr. Kläsi's führt das Thier von dort auf. In der Küstenebene Deli's nicht von mir wahrgenommen.

Dissemurus platurus Vieillot.

Ein, wo Baume sind, überall häufiges Thier, gewährt durch Gestalt, Stimme und Behendigkeit einen schönen Anblick. Der Flaggendrongo ist ein geschworner Feind der Raubvögel, besonders aber der grossen Rhinocerosvögel. Wo er einen solchen erblickt, umschwärmt er ihn beständig unter lautem Geschrei und geht in seiner Frechheit sogar so weit, sich dem fliegenden, unbehülflichen Koloss auf den Rücken zu setzen, eine Zeit lang forttragen zu lassen, und ihn dann wieder kreischend zu mikreisen. Ich habe dies mehrere Male beobachtet. Oder thut dies der Drongo etwa, um die Insecten aus dem Federkleid seines lebendigen Vehikels aufzupicken? Die Entfernung war stets zu hoch, um Genaueres merscheiden zu können. Der Drongo ist ein gewandter Vogel, wie er es

als Insectenjäger ja auch sein muss, und kann durch seine mit eleganten Schwenkungen und Bögen ausgeführten, kurzen Streifzüge, die er von einem als Lieblingsstandort erwählten Baumast aus unternimmt, den Naturfreund stundenlang unterhalten.

Wie mit den Raub- und Rhinocerosvögeln, so macht sich auch der Drongo mit den verschiedenen Affenheerden zu schaffen, namentlich den Krah's (*Cercopithecus cynamolgos*) und folgt ihnen nach. Desshalb haben ihm die Malaien den Namen: *Hamba Krah* (*Krah* = Sclave) gegeben und erzählen darüber folgendes Märchen:

Der Krah und der Drongo wetteten einst miteinander, wer schnellen lausen könne, das Kantjil (Tragulus kantjil) oder die Schnecke; der Drongo behauptete das Kantjil, der Krah die Schnecke sei schnellen Die Schnecke und das Kantjil starteten, und die beiden Wettenden folgten, um zu sehen, wer zuerst das Ziel erreichte. Als das Kantjil dort ankam, rief es: Hier! Doch siehe da, da guckte auch schon aus dem Grase eine Schnecke! Das Kantjil glaubte, es sei dieselbe, mit der es den Wettlauf unternommen und gab sich besiegt. So hatte auch der Drongo verloren und ward zum Sclaven des Krah, der ihm zum Zeichen seiner Knechtschaft Fesseln anlegte (namlich die zwei eigenthumlich verlangerten Schwanzfedern). Die Malaien behaupten heute noch, wenn der Vogel zufällig dieselben verliere, sei er von seiner Knechtschaft befreit und folge dem Krah nicht mehr nach.

Hemipus obscurus Horsfield.

Nicht häufig.

Lanius bentet Horsfield.

Dieser Würger ist ziemlich selten. Ich habe ihn sowohl in Deli und Serdang, wie auch auf dem Plateau von Tobah, in den Karoländern, beobachtet.

Lanius tigrinus Drapiez.

Habe ich bei Labuan in mehreren Exemplaren geschossen.

Die schöne Familie der Nectarinien ist mit sieben Arten repräsentirt.

Anthreptes malaccensis Scopoli und A. phoenicotis Temminck.

Sind überall sehr häufig, besonders aber beleben sie in Massen die Rhizophorengebüsche im Deli-Delta. Mit Vorliebe besuchen sie die Blüthen von Hibiscus rosa sinensis.

Aethopyga siparaja Raffles.

Selten aber überall, sogar bis zum Tobah-See hinauf, wo ich sie beim Kampong Nagasaribu gesehen habe.

Cinnyris hasselti Temminck.

Nicht selten, kommt in die Gärten an Blumen.

Chalcostetha insignis Jardine.

Habe ich in Deli noch nicht beobachtet, doch erhielt ich ein Exemplar vom Rawa-Flusse in Siak.

Arachnothera modesta Eyton.

In den höheren Strecken, z. B. oberhalb Deli-tua bei Petimus häufig. Die meisten Vögel trieben sich mit schnellem Flug in den Gipfeln höherer, einzeln stehender Bäume herum.

Arachnothera longirostra Latham.

Seltener. Ich habe einige Exemplare bei Labuan geschossen, wo sie hie und da Pisangbluthen besuchten, oder in dem Gezweige der Durianbaume ihr Spiel trieben.

Von den schönen, kleinen Blumenpickern, den Dicaeiden, hat merkwurdigerweise weder die Midden-Sumatra-Expedition noch Dr. Klasi Vertreter auf West-Sumatra gefunden. Da ich in der Kustenebene Deli's drei
Arten in zahlreichen Exemplaren gefunden habe und Captain Kelham zwei
Arten von der Westseite Malakka's aufführt, so ergibt sich auch hieraus
wieder die grosse Verschiedenheit der Ornis von Sumatra's Ost- und
Westkuste und die nahe Verwandtschaft der ersteren zu Malakka.

Die drei von mir beobachteten Arten sind:

Dicaeum sumatranum Cabanis.

Häufig bei Labuan, wo sich die Vögelchen Tag für Tag mit lebhaftem Gezirp in den Gipfeln der Fruchtbäume nahe meinem Hause umbertrieben.

Dicaeum chrysorrhoeum Temminck.

Habe ich aus Siak vom Rawaflusse erhalten.

Dicaeum trigonostigma Scopoli.

Ziemlich selten und vereinzelt, hie und da in Buschen und an Waldrandern anzutreffen. Sowohl in Deli als in Serdang. Auf allen Buschen und Baumen in bewohnten Gegenden gemein sind zwei Aegithina-Arten:

Aegithina viridis Bonaparte.

Die gemeinste und

Aegithina viridissima Bonaparte,

die etwas seltnere. Auf der Westkuste scheinen dieselben seltener zu sein, da Dr. Kläsi nur 1, die Midden-Sumatra-Expedition 2 Expl. von viridis aufzählt. Dagegen scheinen die Chloropsis-Arten dort bedeutend häufiger zu sein; ich habe in Deli an den verschiedensten Localitäten nur zwei Arten gefunden.

Chloropsis zosterops Vigors und icterocephala Lesson,

die beide etwa gleich häufig waren. Ich fand sie stets gesellschaftlich, aber nicht zahlreich beisammen in den Gipfeln junger, lichter Buschwälder sich herumtreibend. Wegen ihrer grünen Farbe sind sie nicht gar leicht wahrzunehmen. Der malaiische Name ist Burung daun,

Dendrophila frontalis Horsfield.

Von Baumläusern habe ich nur diese eine Art getroffen; das nicht gar seltene Thierchen rennt lebhaft und munter beständig Stamm auf und ab.

Trachycomus ochrocephalus Gmelin.

Ist nirgends in bewohnten Strecken selten und halt sich paar- und truppweise zusammen. Sein Gesang, den er am öftesten des Morgens und Abends hören lässt, ist laut und wunderbar wohlklingend. Er übertrifft meiner Ansicht nach sogar den von Copsychus saularis.

Pycnonotus analis Horsfield.

Einer der gemeinsten Vögel in bewohnten Gegenden. Mal. Name Mrba.

Rubigula dispar Horsfield.

An denselben Orten, aber nicht häufig. Mal. Mrba.

Micropus melanocephalus Gmelin.

Seltener. Ich habe ein Exemplar oberhalb Deli-tua, bei Petimus in den Vorbergen, geschossen.

Criniger gutturalis Bonaparte.

Ebenfalls nur in einem Exemplar an derselben Localität geschossen.

Von Prachtdrosseln hatte ich die Freude vier Arten zu erbeuten, nämlich:

Pitta cyanoptera Temminck.

Die verhältnissmassig haufigste.

Pitta mulleri Bonaparte.

Etwas seltener, und

Pitta elegans Lesson.

Ebenfalls etwas seltener. Ein Vogel der letzteren Art flog sogar einmal in mein Haus in Serdang und ward dort gefangen. Trotzdem die Pittiden bekanntlich scheue und nur im schattigen Wald auf dem Boden sich aufhaltende Thiere sind, gelang es mir doch mehrmals, dieselben eine Zeitlang zu beobachten. Sie hupften lebhaft auf dem Boden umher, meist zu zweien, untersuchten mit Schnabel und Fuss das durre Laub, flogen auch zur Abwechslung einmal auf einen in guter Mannshöhe befindlichen Ast. Ihr Geschrei war, wenn ich mich noch recht entsinne — die Aufzeichnung darüber ist mir abhanden gekommen — ein lautes "grek-grek". Die Malaien nennen diese Vögel Kuban.

Pitta megarhyncha Schlegel.

Aus Siak endlich, vom Sungei-(= Fluss) Rawa brachten mir meine Leute diese Art in einem Exemplar. Ein zweites soll ihnen entkommen sein. Da meine Jäger noch nicht acht Tage an besagter Localität verweilten, so glaube ich schliessen zu dürfen, dass das Thier dort nicht zu den Seltenheiten gehört. Es war bisher nur von Indien und Banka bekannt.

Aus der Familie der Timeliiden, woran die Westkuste (vgl. den Katalog Dr. Klasi's) so reich ist, habe ich seltsamerweise nur eine einzige Art in Deli gefunden, den merkwurdigen

Macronus ptilosus Jardine und Selby.

Merkwürdig durch sein Gefieder, seinen hubschen Gesang und die sonderbaren Bewegungen, die er während desselben vollfuhrt. Er hält sich stets nahe am Boden und war in dem niederen, an den Wald grenzenden Gebusche längs der Strassen in Serdang nicht selten.

Cittocincla tricolor Vieillot.

Ist in den lichten Jungwaldern von Deli und Serdang keineswegs selten. Ich habe den Vogel mehrmals hoch und weit fliegen sehen. Sein liebster Aufenthalt ist das Gebüsch und Geast in Mannshöhe über dem Boden. Auf das freie Land geht er niemals heraus. Der malaiische Name ist Muray batu.

Copsychus musicus Raffles.

Der gemeinste Vogel in der Umgebung von Wohnstatten. Von lebhaftem Temperament, ist er der erste Vogel, der sein Lied der aufgehenden Sonne entgegensingt, oft schon um fünf Uhr, und er verdient wegen seiner lauten, kräftigen und ungemein angenehmen Stimme, mit der er den Schläfer gewöhnlich weckt, den Beinamen musicus mit vollem Recht. Sein Verschen, das er singt, kann man etwa folgendermassen versinnbildlichen:

Komm wieder mit!

Geh nit vorbei!

Komm wieder mit!

In der Gefangenschaft wird er fast gar nicht gehalten, da er als Insectenfresser schwer zu ernahren ist, bald zu Grunde geht und nicht singt. Uebrigens sucht ja auch der Vogel die Gesellschaft des Menschen sozusagen auf, treibt sich in der Nahe seines Hauses herum und singt ihm sein Lied dicht vor dem Fenster. Sein malaiischer Name ist *Muray*.

Motacilla-Species?

Auf den Sandbanken der Flussuser im ganzen Gebiet habe ich hie und da eine Bachstelze bemerkt, aber leider niemals geschossen, sodass ich die Art nicht anzugeben in der Lage bin.

Limonidromus indicus Gmelin.

Das hübsche Vögelchen spazierte täglich selbander auf dem freien Platze vor meinem Hause und Hospital in Labuan voll Zierlichkeit und Eleganz herum. Seine Farbe harmonirte mit dem Boden so gut, dass man sich wirklich anstrengen musste, ihn nicht hie und da aus den Augen zu verlieren.

Ploceus baya Blyth.

Ueberall in cultivirten Gegenden kann man die Nester von dieser Art oft zu hundert an einem Baum hangen sehen, mit Gelegen von zwei bis zu vier Eiern. Unter den Nestern sind auch viele unfertige und missluckte zu bemerken, offenbar Producte unerfahrener, junger Thiere. Auch in Deli geht die Sage, dass derjenige, welchem es gelingt, das Nest in seine einzelnen Fäden aufzulösen, ohne einen einzigen zu zerreissen, in dessen

Innerem einen goldenen Faden oder Kugel finde. Mal. Name: Tjah rajah mid Banda rajah.

Passer domesticus Brisson.

Unser Haussperling, der auf Singapore in Schwarmen vorkommt, ist in den lezten Jahren auch in Deli eingebürgert worden, und zwar von dem früheren Besitzer des "Deli-Hotel" in Medan. In der Umgebung dieser Stadt is er jetzt schon zahlreich zu finden.

Padda orysivora Linné.

Ebenso scheint mir der gemeine, javanische Reisvogel, den man bei Labuan z. B. schon ziemlich häufig antreffen kann, ursprünglich von importirten, aus der Gefangenschaft entkommenen Vögeln herzurühren.

Munia maja Linné.

Zur Zeit der Padi-Reise kann man in den Reisseldern ganze Schwarme der kleinen Weissköpschen beobachten, die nach hunderten gezählt werden mussen und beträchtlichen Schaden anzurichten im Stande sind. Mal. Name: Banda uban (uban bedeutet im Deli-Dialect: grau melirt, z. B. von greisen Haaren).

An denselben Orten und ebenfalls in grossen Schwärmen finden sich

Munia acuticauda Hodgson und leucogastra Blyth,

letztere bislang nur vom indischen Festland und Borneo bekannt.

Munia punctularia Linné.

Auf der Hochebene von Tobah kommen ausser dieser Art noch eine oder zwei hieher gehörige Arten vor, von denen ich jedoch keine Balge conservirte. Sie waren namentlich zahlreich in Tingging am nördlichen Ende des Tobah-See's. Alle reisfressenden Vögel tragen den gemeinschaftlichen mal. Namen: Banda.

Orthotomus cineraceus Blyth.

Ist ein in allen Gebuschen sehr häufiges Vögelchen. Mal. Name: Soriti.

Gracula javanensis Osbeck.

Unter den Staarvögeln gebuhrt der erste Platz dem bekannten Tjiong der Malaien (bei den Batta's Béo). Derselbe ist überall häufig, lebt in Paaren und kleinen Flugen zusammen, nistet vorzugsweise in abgestorbenen Stammen der Zuckerpalme (Arenga saccharifera) und hat ein

Gelege von vier grunlich blauen, dunkelgesprenkelten Eiern. Jedermann, Eingeborne wie Europäer, halten den Vogel seines eminenten Sprachtalentes halber im Käfig. Dieses steht dem besten Papagei kaum nach, ausserdem weiss er auch die gelernten Worte und Phrasen bei der richtigen Gelegenheit anzuwenden. Ein Bekannter von mir besass einen Béo, der hustete, lachte und sich räusperte wie ein Mensch und zwar in der nur seinem Herrn eigenthumlichen Nuance. Tratt Jemand ins Haus, so wunschte er: "Good morning" oder "Tabé tunku" (malaiischer Gruss). Hie und da fragte er aber auch: Apa lu mau, lu munjet? (Was willst du du Affe?) eine Phrase, mit der sein Herr gewöhnlich die Kulis anredete. Wenn dieser nicht anwesend war, und der Hund, Diana mit Namen, wollte auf die Strasse rennen, um einen Vorübergehenden anzubellen, so rief ihn Beo laut zurück: "Diana!" und pfiff ihm genau wie sein Herr, sodass der Hund stets mit eingezogenem Schwanz wieder umkehrte. Dana beschimpste ihn der Vogel noch mit einem ebenfalls dem Herrn abgelauschten, öfters wiederholten, deutlichen: "Du Chaib, Du Chaib!" (schweizer Schimpfwort) und wie um sich dann selbst zu loben, schrie er dann hie und da laut und freudig: "Beo, Beo, Beo!" Er wusste ganz genau, mit welcher Phrase er den Hund zurückrusen musste, oder einen Eintretenden begrussen, und verwechselte dieselben niemals. Auch Lieder lernte er pfeisen. Doch ahnte er leider nicht blos angenehme Gerausche und Töne, sondern auch höchst unangenehme nach, wie z. B. das Knarren einer Thur, das Kreischen ungeölter Wagenräder, Huhnergeschrei, das Krähen der Hähne, Wiehern der Pferde u.s. w.

Wenn man gesangenen Beo's etwas vorpseist, so kann man bemerken, welchen Eindruck die Musik auf sie macht. Er presst sich fast an die Stabe seines Kasigs an, um den Pseisenden möglichst nahe zu sein, hört mit Fressen auf, sitzt starr da, und neigt den Kopf auf die Seite, um ja keinen Ton der Melodie zu verlieren. Nach einiger Zeit versucht er auch hie und da, an besonders schönen Stellen, einen Ton mitzusingen.

Auch in der Freiheit schon liebt er andere Töne nachzuahmen, und ich war verschiedene Male überrascht, von den Baumwipfeln herunter das Knarren einer Thur oder Pferdegewieher zu vernehmen, vermischt mit dem jauchzenden "Tjiong", seinem natürlichen Ruf, wovon er seinen malaiischen Namen hat.

In der Gefangenschaft liebt der Beo ausserordentlich die Schoten des spanischen Pfeffers (Capsicum cassicum) die er händevollweise hinunterschluckt und sehr oft wieder ganz von sich gibt. Er ist ein sehr gefrässiges Thier und beschmutzt seinen Käfig abscheulich.

Calornis chalybaea Horsfield.

Mal. Brling. Ist sehr häufig und überfällt in ganzen Schwärmen die Obstgärten. Er liebt besonders die Früchte von Carica papaya.

Sturnia daurica Pallas.

Zog, aber nur in der Regenzeit, allabendlich gegen 6 Uhr in ausserordentlich zahlreichen Flugen über mein Haus in Labuan mit reissender
Schnelligkeit dahin; ein aufs Gerathewohl abgeseuerter Schuss brachte
oft ein ganzes Dutzend herab, die einen sehr wohlschmeckenden Braten
für die Küche lieserten. Auf Sumatra bislang noch nicht gefunden.

Oriolus indicus Brisson.

Mal. Selimpukan; ist überall häufig und ergötzt ebenfalls durch seinen schönen Gesang, den er sogar, angeschossen, noch in der Hand des Jägers hören lässt, wie mir dies selbst vorgekommen ist.

Oriolus melanocephalus Linné.

Ist in grossen Mengen von mir in der Umgebung von Labuan beobachtet und geschossen. Für Sumatra neu.

Oriolus xanthonotus Horsfield.

Im ganzen Gebiet, aber vereinzelt und selten.

Dendrocitta occipitalis Muller.

Erhielt ich in zwei Exemplaren von einem Batta von dem Plateau von Tobah aus den Karoländern. In der Kustenebene habe ich diesen Vogel mie beobachtet.

Platysmurus leucopterus Temminck.

War in Serdang nicht besonders selten, in Deli habe ich ihn nie gesehen.

Corvus validus Bonaparte.

Ist im ganzen Gebiet nicht selten, aber zerstreut. Bei Tandjong-Morawa, in Serdang, sah ich sein Nest in einem Baumwipfel in 30—40 Fuss Höhe. Die Malaien nennen den Raben, dessen Geschrei ähnlich dem des unsigen, aber dunner und heller ist, "Gak" oder "Gagak".

Die Tauben sind ungemein zahlreich, in zwölf Arten vertreten. Alle Busche und niederen Wälder beleben sie in ganzen Flugen und vereinzelt, und es wird kaum einen Pflanzer in Deli geben, der nicht schon

des Nachmittags zwischen vier und sechs oder des Morgens zwischen sechs und acht Uhr, zu welchen Zeiten die Tauben kröpfen, auf einen alten, verlassenen, rechts und links mit halbwüchsigen Baumen bestandenen Pflanzweg hinausgegangen ist, um sich einen wohlschmeckenden, saftigen Braten zu schiessen und dadurch einige Abwechslung in den Kuchenzettel zu bringen, der sonst beinahe stets: Huhn mit Reis, oder: Reis mit Huhn, lautet. Durch böse Erfahrungen gewitzigt, wissen auch die Tauben einen flintentragenden Menschen gar bald von einem harm losen Spaziergänger zu unterscheiden; wer heute zum erstenmal auf einem Wege geht, wo die Tauben noch niemals behelligt worden sind, um der flattert es nur so von den zur Nachtruhe aufbäumenden Vögeln und ei kann sich gemächlich ein Dutzend herabschiessen; am nächsten Abend wird er aber kaum noch sechs überlisten, und in einigen Tagen kanner sicher sein, keine lebende Feder mehr vor sein Rohr zu bekommen, wenn er sich nicht ausserordentlich vorsichtig anzuschleichen versteht. olivengrunen Treron-Arten wissen recht gut, welch ein Schutz ihr gleich farbiges Kleid zwischen den grunen Blättern ist; auf den ersten Schuss fliegen nur die furchtsamsten und erschrockensten davon; die anders bleiben unbeweglich stillsitzen und ducken sich möglichst tief in das Geblätter, sodass es eines unendlich geübten und scharfen Auges bedarf, um noch eine zu entdecken. Ein Neuling wird glauben, dass alle Tauben fortgeflogen seien, so still und ruhig ist es in dem Gipfel; kennt man aber ihre Schliche und geht rings um den Baum, um ihn von allen Seiten gehörig zu inspiziren, erst dann schwirrt husch! husch! husch! eine nach der andern noch nachträglich davon. Die Tauben wissen also ganz nothwendig um den Schutz, den ihnen ihr Gefieder verleiht, und auch nur desshalb scheinen sie mir gewisse Baume - wenn ich nicht irre, eine Calophyllum-Art - zu bevorzugen, deren dichte Blätter sowohl in Grösse als in der eigenthumlich graugrunen Farbe ausserordentlich gut zu den Tauben passen. Ich schäme mich nicht zu bekennen, dass es mir einigemale passirte, auf ein solches Blatt geschossen zu haben, welches ich, von dem grellen Abendsonnenschein geblendet, für eine "Mimicry" treibende Taube hielt. Treron-Arten haben einen eigenthumlichen Ruf, welcher etwa einem sanften, zwitschernden Jodeln zu vergleichen ist; die grossen Carpophaga-Arten jedoch verrathen sich durch einen dumpfen, hohlen Laut, der weithin vernehmbar ist. Auch kommen die letzteren nur beim Kröpfen in Flugen zusammen; den ubrigen Theil des Tages sitzen sie einsam und trage hoch auf einem am liebsten kahlen und todten Ast.

Die Früchte gewisser riesiger Feigenbäume bilden das Lieblingsfutter für die Treron- und Carpophaga-Arten, und zur Fruchtzeit wird derselbe son tausenden und aber tausenden besucht, einerlei ob er im dichten Urwald oder frei und isolirt neben der Wohnung eines bratenlustigen Planzers steht; ein dumpfes Sausen und Brausen, das wie "roa-roa" klingt, verkundigt dann schon von weitem die ungeheure Gefrassigkeit dieser Thiere. Die Zeit des Kröpfens wird streng eingehalten. Die ersten bei der Mahlzeit sind die grossen Carpophaga-Arten; sie kommen schon m halb sechs Uhr in kleineren und grösseren Trupps. Gegen halb sieben Uhr etwa fangen sie an sich zurückzuziehen und dafür erscheint nun die ebenfalls sehr grosse Treron capellei, nicht zu Dutzenden wie die vorigen, sondern in Flugen von vielen Hunderten. Nach einer weiteren kleinen Stunde andert sich wieder der Character der Besucher; die gesättigten Fluge ziehen fort und machen allmälig den kleineren Treron-Arten Platz, die den grossen, riesigen, von goldgelben Fruchten strozzenden Baum bis etwa acht Uhr beleben. Von da an hängt nur noch der früher erwähnte Lopang (Megalaema chrysopogon) an den Zweigen. Des Abends gegen funf Uhr findet wieder dasselbe Gewühl, nur nicht in so strenger Ordnung und bedeutend weniger zahlreich, statt.

Die kleineren Treron-Arten nisten im Gebüsch kaum mannshoch über dem Boden in einem flachen Reisernest; das Gelege besteht gewöhnlich aus nur zwei weisslichen Eiern.

Die Arten, welche ich beobachtet habe, sind:

Treron nasica Schlegel.

Nicht sehr häufig, besonders in Serdang.

Treron oxyura Temminck.

Dieses Thier kommt in der Küstenebene nicht vor, bildet aber auf dem ganzen Plateau von Tobah den, so viel mir bekannt, einzigen Verteter der Tauben dortselbst. Ich habe Exemplare auf dem Gipfel des Danda-binoa in über 6000 Fuss Meereshöhe geschossen.

Treron vernans Linné, Treron olax Temminck und Treron pulverulenta Wallace.

Sind die gemeinsten Arten. Alle diese zusammen werden von den Makien Punej genannt.

Treron capellei Temminck.

Ist ebenfalls sehr häufig, und heisst nach ihrem Ruf: Ngroa-ngroa. Von der Kuste werden oft ganze Bootsladungen dieser Thiere, welche

mit Getäh (Leim) oder Schlinge gefangen sind, lebend auf den Mark nach Deli gebracht und das Stück zu fünfzehn Cents englisch verkauft.

Carpophaga perspicillata Temminck.

Mal. Prgam, ist ebenfalls nicht selten und wird von den Malaien wie die vorige gefangen. Ich habe öfters gesehen, dass man ihr die Augenlider zunähte!

Carpophaga badia Raffles.

Ist viel seltener. Ich habe nur in Serdang zwei Exemplare erbeutet.

Ptilopus jambu Gmelin.

Diese prachtvolle Taube habe ich in grossen Flugen, aber stets nur in den Baumwipfeln des dichtesten Urwaldes wahrgenommen, wohin, die Carpophaga-Arten ausgenommen, keine andere Taube geht.

Chalcophaps indica Linné.

Von den Malaien Punej tanah, Erdtaube, genannt, weil sich das schöne Thier am liebsten auf dem Boden und zwar der dichten Wälder und abgelegenen Gebüsche aufhält. Die Malaien lieben ihr Fleisch ausserordentlich und stellen ihnen leidenschaftlich nach. Sie bauen zu dem Zweck an einem Ort im Walde, wo sie wissen, dass die Erdtaube sich aufhält, eine möglichst verborgene Laubhutte, deren Wände das Durchgreifen gestatten, streuen aussen bis dicht an die Wand Futter, und hocken sich hinter ihren Schirm, indem sie den sanften, hohlen Lockruf der Erdtauben ausgezeichnet nachmachen. Sobald die Thiere erscheinen und Futter pickend, der Laubwand zu nahe kommen, werden sie von Innen schnell ergriffen und in Sicherheit gebracht. Diese langsame, zeitraubende Jagd können eben auch nur die ruhigen, phlegmatischen Malaien ausüben! Die Erdtaube hat einen reissend schnellen Flug, hält sich aber immer ziemlich nahe dem Boden; man kann sie oft wie einen grüngoldigen Blitz durch das Gebüsch schiessen sehen.

Turtur tigrinus Schlegel.

Ueberall, besonders aber auf Brachfeldern, sehr häufig, oft in ganzen Flügen. Auch auf der Hochebene von Tobah bis zum gleichnamigen See in grosser Menge. Ihr malaiischer Name ist *Balam*. Sie ist der Lieblingsvogel dieses Volkes. Beinahe jeder Malaie hält sich eins oder ein Parchen dieser Thierchen, deren Stimme ein angenehmes, sanstes Rucksen ist, ja er nimmt sie sogar gewöhnlich auf seinen Gängen und Reisen mit.

Es ist merkwurdig zu sehen, wenn einem mitten im Wald so ein wildes Malaiengesicht begegnet, in der einen Hand kampf bereit den haarscharten Parang, in der andern, auf einem flachen, tellerartigen Untersatz ohne Gehause sein Turteltaubchen, das er wie seinen Augapfel hutet und für des er oft sein ganzes Vermögen (10—15 Dollars für ein schönes Mannchen) ausgibt. Dies thut er jedoch nicht wegen ihrer Federpracht oder ihres schönen Gesanges, sondern einzig und allein, weil die streitlustigen Mannchen ihm einen Ersatz für seine vielgeliebten Hahnengefechte bieten Sogar der Sultan von Deli halt sich solche Kampftauben.

Gefangen werden die Balam's fast ausschliesslich in feinen Rosshaarschlingen, die man in der Nähe im Kreise herumsteckt. Im Innern desselben liegen Reiskörner verstreut und sitzt der Lockvogel versteckt.

Geopelia striata Linné,

bei den Malaien Mrbo genannt, ist ebenfalls nicht selten. Bei Labuan babe ich etwa ein Dutzend dieser hubschen Taubchen bemerkt, von denen immer das eine oder andere Parchen auf dem freien Platze vor meiaem Hause umhertrippelte. Es könnte jedoch auch sein, dass die in der Kustenebene befindlichen Thiere entflogene Gefangene oder Nachkommen derselben sind, denn ihr eigentliches Verbreitungsgebiet ist entschieden auf den Bergen, dem Plateau von Tobah, und namentlich die Umgebung des nördlichen Theiles des Tobahsees, wo es von den Battas zu hunderten gefangen und zum Verkauf nach der Kuste gebracht wird.

Auch dieses Thierchen halt der Malaie gern und erfreut sich an seinem ungemein schwachen und zarten, flötenden Rucksen, das wie "tuhtuhtuhtuh" klingt.

Argusianus argus Linné.

Von den Fasanenvögeln ist naturlich zuerst der prächtige Argusfasan anzufuhren. Ueberall wo es noch dichte, jungfräuliche Walder gibt, ist der Argusfasan ein sehr häufiges Thier, der von früh Morgens bis spät in die Nacht, ja oft sogar noch um Mitternacht sein lautes, jauchzendes, weithin durch den Wald hallendes "Uauw—wau" (woher sein malaiischer Name: "Uau", nicht Kuau, wie auf der Westkuste) erschallen lässt. Auf jedes Geräusch im Wald, auf die Stimmen von Menschen, das Gewieher von Pferden, auf Alles, ja sogar auf Gewehrschüsse gibt er Antwort. Die momentan entstandene Todtenstille sofart nach einem Schuss unterbricht das jauchzende, gewissermassen verwunderte "Uauw" unseres Vogels, und war so nahe, dass man sich unwillkürlich nach demselben umsieht. Aber

dies ist völlig vergebens; denn so vorlaut der Argusfasan ist und zu jedem Ton seine Stimme abgeben zu mussen glaubt, so vorsichtig und scheu ist er auch, und ihn zu Gesicht oder gar zum Schuss zu bekommen, ist fast eine Unmöglichkeit; ich kenne keinen Jäger, weder einen europäischen noch einen inländischen, dem es trotz hundertfacher Versuche gelang, ein solches Thier zu erlegen. Und doch weiss ich zwei Pflanzer zu nennen, vollkommen glaubwurdige Leute, die mir versicherten, während ihrer Arbeiten im Dschungel je eine Gesellschaft derselben zufällig gesehen und einen Hahn erlegt zu haben. Da ich an der Richtigkeit dieser Mittheilungen keinen Grund zu zweiseln habe, so kann ich nur annehmen, dass die Thiere auf ihren Balzplätzen, wo ihnen wahrscheinlich auch wie bei andern Vögeln ihre scharsen Sinne für einen Moment umnebelt sind, überrascht wurden. Gehör und vielleicht auch der Geruch müssen bei ihnen ausgezeichnet sein; denn, bauend auf die Erfahrung, dass der Uau jeden lauten Ruf gern und herausfordernd beantwortet, combinirte ich mir nach vielen erfolglosen Versuchen einen Jagdplan. Ich blieb ruhig auf einem Waldpfade stehen und ahnte das Geschrei des Vogels nach, was mir recht gut gelang: der Uau antwortete auf jeden Ruf und kam offenbar, von Neugierde getrieben, näher. Nun hatte ich meine zwei malaiischen Jager einige zwanzig Schritte rechts und links sich langsam und vorsichtig still in den Busch schleichen lassen, um den Standort des Uau während seines Geschreies zu erspähen und ihn selbst zur Strecke zu bringen. Eine Zeit lang ging dies auch ausgezeichnet; der Vogel antwortete lustig und von meinen zwei Jagern war Nichts mehr zu sehen und zu hören; ich glaubte schon, dass meine List triumphiren werde. Da plötzlich war der Vogel verstummt und gab keinen Laut mehr; er hatte den Braten gerochen und sich empfohlen. Das beste und einzige Mittel, ihn zum Schuss zu bekommen, wird demnach immer nur sein, sich zur Balzzeit, des Morgens zwischen funf und sieben Uhr, wie mir die Malaien versicherten, auf einem seiner Spielplatze anzuschleichen. Diese Spielplatze sind rundliche, freie, von jedem Graschen und Aestchen gereinigte Platze von vielleicht 50 Schritt Durchmesser, mitten im dichtesten Wald verborgen, von denen aus mehrere leicht ausgetretene Pfade wegführen. Dort gibt der Hahn mit ausgebreiteten Flugeln und Schwanz den ringsum im Gebüsch sitzenden Hennen seine erotischen Tanze zum Besten. Bekannt mit diesen Eigenthumlichkeiten, haben die Malaien eine eigenthumliche Fangmethode erfunden. Den Leuten, welche sie mir erzählten, glaubte ich anfanglich nicht. Ich habe aber später so oft diese Angaben bestätigt gefunden und auch mit Hülfe meiner erfahrenen Jager,

frelich ohne Erfolg angewandt, dass ich an der Wahrheit der Thatsache nicht mehr zweifle. Die Malaien nämlich spitzen drei Fuss lange Bambusplitter messerscharf zu und graben sie auf den Spielplätzen zwei Fuss tief senkrecht in den Boden, sodass sie noch einen Fuss hervorstehen. Kommt nun der Hahn und will seinen Weibchen etwas vortanzen, so wird er durch den Bambusplitter gar sehr gehindert. Er sucht ihn dessbalb zuerst mit den Fussen und da das nicht geht, mit dem Schnabel brtzuschaffen und herauszuziehen. Durch das Misslingen immer wüthender gemacht, dreht und zerrt er so energisch, indem er um den Splitter herumläuft, dass er bald mit seinem Hals den scharfen Seiten desselben zu nahe kommt und sich so selbst die Kehle abschneidet. Bedingung ftr das Gelingen dieser Fangmethode ist, dass man seine Spur beim Herrichten des Bambusplitters vollkommen zu verwischen versteht, und daran scheinen meine Versuche gescheitert zu sein. In Schlingen wird abrigens der Argusfasan von den Malaien oft gefangen und in Serdang konnte ich für zwei Dollar pro Stück eine Menge derselben haben. In der Gefangenschaft halt sich unser Vogel, wenn man ihm genügenden Spielraum lasst, sehr lange. Das Hauptfutter der meinigen war Reis, gekocht and roh. Der Vogel brutet auf dem Boden, wie es scheint in Mulden zwischen Baumwurzeln oder Erdlöchern. Mein Jäger brachte mir einst zwei beinahe ganseeigrosse, grunlichweisse Eier, die er in einem solchen Erdloche fand, und von denen er behauptete, sie gehörten dem Argusfasan an

Die Malaien unterscheiden übrigens mehrere Arten von Uau's, und ich glaube, dass sie darunter verwandte Thiere, wie Polyplectron, verstehen. Von diesen jedoch habe ich niemals ein Stück erhalten, sodass ich auf ihr Vorkommen nur aus der obenerwahnten Thatsache schliessen kann. Wenn also ein Polyplectron oder ahnliche Vögel vorkommen sollten, was nicht unwahrscheinlich ist, weil man sie sowohl in Malakka als auf der Westküste Sumatra's gefunden hat, so müssen sie ausserordentlich selten sein, denn die Malaien hatten gewiss nicht versaumt, mir einen solchen Vogel, den ich stets mit einer angemessenen Summe zu bezahlen versprach, zu bringen.

Das Waldhuhn, mal. Ayam utan, oder Ayam rimba,

Gallus ferrugineus Linné,

ist ebenfalls sehr häufig. Es hält sich in Paaren und kleinen Trupps vorzugsweise in buschigem Jungwald und an den Rändern des Urwaldes auf. Sein Krähen ist viel heller und kürzer, nicht so lang hinausgezogen

wie bei unserm Haushahn, ein ganz kurzes, abgebrochenes Kíkerikí. Das Waldhuhn ist sehr scheu und schlau, und ich habe nur ein einzigesmal eines zum Schuss bekommen. Ihre Anzahl hat sich seit Anlegung der Tabaksplantagen in Deli beträchtlich vermehrt, weil erstens hiedurch viel buschiger Jungwald geschaffen wurde, und zweitens, weil den überall zerstreut wohnenden Kulis eine Menge zahmer Hühner in den Wald entliesen und verwilderten. Der Waldhahn lockt die zahmen Hühner formlich an und verleitet sie zur Flucht, wie ich das an meinem eigenen Hühnerhofe mit Verdruss bemerkt habe; das umgekehrte, dass ein wilder Hahn sich von zahmen Huhnern in den Stall locken lässt, kommt niemals vor. Ich glaube, dass man jetzt in Deli mehr verwilderte, als wirklich wilde Hühner antreffen wird. Die Kampflust der Hähne gereicht ihnen zum Verderben, indem die Malaien ihre Fangmethode darauf grunden. Sie tragen einen halbgezähmten, wilden Hahn an einen Ort, wo sie Waldhuhner vermuthen, binden ihn dort an ein Stuck Holz auf dem Boden fest und stellen kreisförmig die Schlingen um denselben herum; die auf das Krähen des fremden Hahnes erbost herbeieilenden Thiere werden so mit leichter Muhe die Beute der Vogelsteller.

Euplocamus vieilloti G. R. Gray.

₹

Das grosse Fasanhuhn, von den Malaien Bleiang genannt, ist in jungfräulichen Wäldern ebenfalls ein sehr häufiges Thier, das man leicht überraschen kann; ich habe verschiedene geschossen. Sie laufen im dichten Wald nach Hühnerart behend auf dem Boden umher und huschen mit grossen Schritten über die Pfade; doch scheinen sie auch oft von ihren Flugeln Gebrauch zu machen, denn so oft ich in Serdang durch den Wald ging, konnte ich alle paar Minuten das dumpfe, durch die Resonanz des Waldes verstärkte und wie ein fernes Donnergrollen klingende Geräusch des Auffliegens unseres Bleiang vernehmen. In Gefangenschaft halt sich der Vogel nicht lange; ein Lieblingsfutter sind die herabsallenden Fruchte der Feigenbäume, welche auch die Tauben so gerne fressen, und dabei werden die Thiere von den Malaien oft in Schlingen gefangen. Ihr Fleisch habe ich, ganz junge Thiere ausgenommen, zu allen Zeiten zähe und unschmackhaft gefunden. Einen schönen Anblick gewährt die grosse ultramarinblaue Augenhaut des Hahnes mit dem feuerrothen Auge darin. Auch dieser Vogel ist für Sumatra neu. Mein Freund Buttikoser schrieb mir: E. vieilloti ist eine überraschende Neuheit für Sumatra." Henry O. Forbes in seinen "Wanderungen eines Naturforschers",

bers. v. Teuscher, führt ihn jedoch in seiner Liste sumatranischer Vöel (von Padang) auf, nach welchem Autor gibt er nicht an.

Turnix pugnax Linué.

Der Pujo, wie ihn die Malaien nennen, ist in allen Lalangsavanen genein, wo er sich in Trupps bis zu zwölf Stuck und mehr herumtreibt.
Er ist ebenfalls ein Lieblingsvogel der Malaien, den man fast eben so
aufig gefangen sieht, wie die Turteltaube, und aus demselben Grunde.
Jenn die Kampfwachtel hat ihren Beinamen pugnax nicht umsonst. Wähend es sonst aber die Männchen, die Hähne sind, welche kämpfen,
ind es hier einmal ausnahmsweise die viel robusteren Hennen.

Um die Kampswachteln zu sangen, setzen die Malaien ein Weibchen heinem vorn mit einer Art Fallgatter versehenen Käsig aus. Der dumpse us des Gesangenen, der etwa wie hu-hu-hu klingt, lockt die wilden Vachteln an, die kampsbereit dem Lockvogel auf den Leib rücken und ich plötzlich, wenn sie auf das Sperrhölzchen getreten sind, innerhalb es Fallgatters gesangen sehen. Eine gute Kampswachtel steht einer Turktaube im Preise gleich. Auch die Batta's halten die Pujo's, um sich an iren Kampsen zu ergötzen, und die Thiere aus den Bergen und vom lateau von Tobah haben sogar den Ruf besonderer Stärke und Krast. ie werden desshalb viel nach der Küste herab verkaust.

Excalfactoria sinensis Linné.

Die Zwergwachtel ist, an denselben Orten wie die vorige, nicht gar zufig. Sie heisst bei den Malaien *Pujo padang*, und wird hie und da benfalls zum Kampf abgerichtet.

Rollulus roulroul Scopoli.

Ist in lichtem Wald nicht gerade sehr selten und wird von den Maien, bei denen der Vogel Siatung heisst, in Fallen und Schlingen geingen. Ich besass ein Parchen derselben lange Zeit lebend.

Charadrius fulvus Gmelin.

Watet in Gesellschaft zur Ebbezeit auf dem Schlamme am Küstensaum erum. Ich habe das Thier nur bei Serdang gesehen, und nur in einem inzigen Trupp.

Charadrius mongolicus Pallas.

Auf den Schlammfeldern der Kuste häufig.

Totanus glareola Linné.

An den Sandbanken und Ufern aller Flusse sehr häufig, bis weit in: Land hinauf. Auch diesen Vogel gibt Forbes u. a. O. von den Lampongs an

Totanus calidris Gmelin.

Seltener, zur Ebbezeit auf den grossen Schlammbanken vor der Mundung des Deliflusses.

Totanus hypoleucos Linné.

An denselben Orten gemein.

Terekia cinerea Guldenstedt.

Ebendort, häufig, meist in grossen Schwärmen bis zu hundert Stück welche mit grellem, schrillem Geschrei, wie ein langgezogenes "Krihk" klingend, über die ausgedehnten Schlammfelder hinstreichen.

Ein Schuss in einen solchen Schwarm lasst oft ein ganzes Dutzend her abpurzeln. Sie haben, wie alle bisher erwähnten Wasser- und Strandlaufer, ein zartes, wohlschmeckendes Fleisch und werden darum oft geschossen.

Numenius arcuatus Linné.

Gesellschaftlich und ziemlich häufig an der obengenannten Meereskuste. Durch seine Grösse und seine Klugheit dominirt er unter dem Vogelgewimmel auf den dortigen Schlammbanken ganz entschieden. Wen jemals schon ein Numenius geäfft hat, indem er langsam, gleichsam spie lend und herausfordernd, gleichen Schrittes mit dem anschleichenden Jäger und immer ausser Schussweite bleibend, zurückweicht, dann abei plötzlich, wenn ihm dies Spiel zu lange dauert, unter seinem schrillen uberlaut hallenden Hohngelächter "Krähk-Krähk", das erst in weiter Ferne erstirbt, dahinfliegt und dadurch jede lebende Feder auf einen Kilo meter in der Runde verscheucht, der wird begreifen, mit welchem Aerger ich diesen schlauen, hohnlachenden Gesellen, den ich niemals in Schussweite bekommen konnte, erwähne. Gefangen habe ich ihn trotz seiner Wachsamkeit doch einmal in einem malaiischen Fischerdorf gesehen. Er befand sich anscheinend, mit einem durch seine Nasenlöcher gezogenen Bindfaden angebunden, nicht übel, und betrug sich ganz zahm, wie ein Philosoph, der auch des Lebens Missgeschick mit Wurde zu tragen weiss.

Gallinago stenura Kuhl.

Diese Beccassine ist von October bis etwa Mitte Februar nicht selten, it sogar, besonders auf Grasslachen, wo Heerden zu weiden gewohnt ind, sehr häufig. Sie fallt dort regelmässig kurz vor Eintritt der Dunkelteit ein, und lässt sich, selbst wenn mehrere Abende hintereinander auf e gejagt wird, von einem solchen Ort nicht vertreiben, wahrscheinlich eil derartige Localitäten in Ermanglung grosser Viehheerden selten sind ind weil die sonst so bevorzugten Sawahreisselder auf der Ostkuste gänzth fehlen. Sie wird nur viel vorsichtiger und fallt dann erst nach Einruch der völligen Dunkelheit ein. Während des Tages überrascht man it eine und die andere am Rande seuchter, sumpfiger Strassengräben.

Von Sumpf- und Wasserhühnern (Rallidae) kann ich vier Arten anhren: die häufigste ist

Erythra phoenicura Pennant,

al. Roa-roa genannt, nach seinem Geschrei. Dasselbe ist überall zu finen, wo sumpfiges, feuchtes Gebüsch ist, vornehmlich an Flussufern, ad beschrankt sich nicht auf den Boden allein, sondern klettert und legt auch gerne im niederen Busch.

Hypotaenidia striata Linné,

al. Sintar, lebt paarweise und bis zu kleinen Trupps in Sümpfen, geht ber auch, wie ich beobachtet habe, auf trockenes Land, z. B. Lalangiesen, heraus. Häufig, besonders in der Umgebung von Labuan. Als heinst den Wunsch aussprach, lebende Exemplare zu kaufen wurden ir in Zeit von einer Woche gegen zwanzig Exemplare von den Malaien ebracht, alle frisch in Fallen gefangen. Ich hatte vorher höchstens ein ind das andere Thier einmal über den Weg laufen sehen. Im Käfig hielm sie sich nur etwa vierzehn Tage.

Rallina fusca Linné.

Nicht haufig, wie es scheint, denn ich erhielt nur ein gefangenes Exemplar.

Gallinula chloropus Linné.

n Sumpfen und stehenden Wasserläufen ebenfalls nicht sehr häufig. Ich abe von meinen Jägern auch Exemplare von der Hochebene von Toah aus den Karoländern erhalten. Von Reihern sind an den Ufern aller Flusse, besonders aber im Delta des Deliflusses, häufig:

Ardea macrorhyncha Gould.

Das für Sumatra neue Thierchen sitzt gewöhnlich auf dem Boden in der Nahe des Wassers zwischen den Stengeln des jung aufschiessenden Gebüsches und ist so wenig scheu, dass es sich mit langsamen, gravitätischen Schritten nur eben so weit ins Gebüsch zurückzieht, um aus dem Gesichtsfeld zu kommen. Ein auf Gerathewohl nachgesandter Schuss wird es desshalb immer erlegen. Mal. Tiong ayer.

Ardea cinerea Linné

habe ich am Meeresstrande bei Rantan pandjang, in Serdang, oft gesehen. Sie fischten truppweise zusammen, indem sie, in einer Reihe nebeneinander stehend, langsam gegen das Ufer vorrückten.

Ardea purpurea Linné.

In der Kustenebene selten, desto haufiger aber auf dem Plateau von Tobah, besonders an den Ufern des gleichnamigen Sees. Ich hatte dort bestandig mehrere dieser Reiher im Gesichtsfeld, und sie waren so wenig scheu, dass sie mich, auf den kahlen Wiesen sitzend, ungedeckt, bis auf 10 Schritte herankommen liessen. Nach einigen Tagen jedoch, nachdem sie das verderbliche Feuergewehr kennen gelernt hatten, kostete es schon grosse Mühe, noch einen zu überlisten. Zum Schlafen sah ich ihn auf Baumen dicht bei den Hausern der Batta-Kampongs.

Ardea sumatrana Raffles.

Selten und vereinzelt, sowohl am Seestrande als an Sümpfen im Innern Deli's von mir beobachtet.

Bubulcus coromandus Boddaert.

Mal. Bango putch. Zu gewissen Zeiten häufig und fast immer truppweise. Auch ich habe ihn oft auf ruhenden Karbau's sitzen sehen, ebenso oft aber auch Exemplare von hohen Durianbäumen herabgeschossen.

Einen dem vorigen sehr ähnlichen Reiher habe ich einmal, auf eine ziemlich weite Entfernung, am Seestrande bei der Mündung des Deliflusses sitzen sehen. Da ich das Thier nicht schiessen konnte, bin ich nicht im Stande anzugeben, ob es der gewöhnliche Kuhreiher, oder eine andere Art war; ich bin jedoch geneigt, das Letztere zu glauben, da ich sonst nie einen Kuhreiher am Seestrande und ganz allein gesehen habe.

Nycticorax griseus Linné.

Ich habe ein einziges Exemplar Nachmittags um 4 Uhr quer über die Mindung des Serdangflusses streichen sehen. Abends mit Einbruch der Dunkelheit kam dasselbe dann heraus in das seichte Wasser am Strand und fing dort nach Reiherart zu fischen an. Ein Schrotschuss lähmte seinen Flügel, aber es kostete grosse Mühe, den Nachtreiher, der mit grosser Schnelligkeit laufend das nahe Gebüsch zu erreichen suchte, zu haschen und dingfest zu machen. Bekannt von Java, Borneo und Banka; für Sumatra neu.

Leptoptilos javanicus Horsfield.

Der Bangoh, wie ihn die Malaien nennen, ist am Seestrande bei Deli schr haufig und streicht von da, oft in ungeheurer Höhe seine majestätischen Kreise ziehend, durch das ganze Land. Er wird sehr zahm und von den Europaern oft als Hausthier gehalten. Ein ehrwurdiger Kahlkopf, nur im Nacken mit einigen spärlichen Haaren versehen, bewegt er sich in seinem schwarzen Frack und weisser Weste voll abgemessener Warde und Anstand überall frei, und ungenirt umher, erhebt sich in die Lut, macht grosse Aussluge und kehrt wieder, wenn auch in grossen Zwischenraumen, zurück, indem er als kleines Punctchen hoch oben in der Luft erscheint und sich schraubenförmig langsam ohne Flügelschlag herablasst. Er gibt und erhält auch gelegentlich Besuch von seinen wilden Verwandten. Futter braucht man dem Bangoh gar keines zu geben, da er sich vollkommen selbst ernähren kann, und zwar vorwiegend mit Insecten, meist Orthopteren, die er, wie ein Storch vorwarts schreitend, und bei jedem Schritte den Kopf wagerecht vorwerfend, geschickt mit seinem grossen, ungeheuren Schnabel von den Grashalmen weghascht. Gibt man ihm aber ausserdem noch gutes Futter - er ist nicht wählerisch - so lohnt er es durch Anhanglichkeit an Hof und Haus, auf dessen Dach er sich gerne setzt, und durch eigenthumliche mit grossem Anstand und Zierlichkeit ausgeführte Verbeugungen und Complimente, die er mit hib ausgebreiteten Flugeln und unter freudigem, halblautem "gahk-gahkgahk" macht, so bald er seinen Herrn mit dem Futternapf sieht. Man kann ihn ubrigens auch sehr böse machen, wenn man etwa ein Taschentuch vor seinem Kopf hin- und herschwenkt oder ihn sonst reizt. Dann kuft er selbst seinem Pfleger erbost nach und hackt mit seinem gefahrichen Schnabel nach ihm, besonders aber nach dem Tuch. Auch fremde Personen angstigt er zuweilen durch solche, aus purem Vergnügen unternommene, Attaken. Nach jedem Angriff, ob geglückt oder misslungen, klappert er mit dem Schnabel einen Triumph- und Siegesmarsch. Der Bangoh sitzt sowohl gern auf den Sande des Seestrandes, als in den Gipfeln der höchsten Baume. Ueberrascht man ihn an ersterem Ort, so zieht er sich meist, anstatt aufzusliegen, was ihm einige Mühe zu kosten scheint, mit grossen, eiligen Schritten nach dem nahen Rhizophorendickicht zurück. Meine Leute sind ihm oft dahinein gefolgt und haben ihn gefangen oder erschlagen, denn das Wurzelgewirr und die Aeste hindern ihn sowohl am Fliegen, wie am schnellen Laufen. Doch mussten sie sich stets dabei vor seinen heftigen, nach den Augen gerichteten Schnabelhieben in Acht nehmen.

Pelecanus-Species?

Hie und da sah ich auch, ziemlich weit auf dem Meere draussen, einen einsamen Pelekan fischend seine Kreise auf dem Wasser zichen. Das Thier war aber so scheu, dass gar keine Möglichkeit war, ihm auf Schussweite anzukommen.

Podiceps minor Latham.

Den kleinen Zwergtaucher habe ich nur an einer einzigen Stelle, aber zahlreich, namlich am Tobah-See, auf der Hochebene in der Bucht von Tinging beobachtet. Sie hielten sich von Anfang an scheu in mehr als Schussweite vom Ufer ab, und ich musste, um sie zu erlegen, in einem sehr kleinen, bei der geringsten Bewegung umkippenden Einbaum hinausfahren. Nach zweimaliger Jagd waren sie so scheu geworden, dass es mir dann nicht mehr gelang, an sie heranzukommen. Die Localität Sumatra ist neu.

Von Möwen, deren ich mindestens eine Art beobachte, gelang es mir nicht Exemplare zu schiessen. Eine

Sterna alba? Linné,

war sehr häufig, in grossen Flugen auf dem weissen Strandsande bei Serdang. Ich konnte auch diese niedlichen Thierchen oft beobachten, wie sie, in dichten Haufen des Morgens etwa um 8 Uhr, spielend über einer Stelle des Meeres sich herumjagten, auf und nieder stiegen und einmal über das andere lustig zwitschernd kopfüber in die klaren Fluthen stürzten.

Dendrocygna arcuata Cuvier,

mal. Beliebis, ist in den Sumpfen und Graben bei Labuan in grosser

nzahl vorhanden, und die malaiischen Fürsten halten oft Jagden auf dieeben ab, wobei viele Dutzende erlegt werden. Am besten sind sie des forgens früh vor Sonnenaufgang zu beschleichen. Sie liefern einen wohlchweckenden Braten.

Anas scutulata S. Muller.

Eine grosse Ente, lebt einsam, seltener paarweise, an den verborgen, abgelegenen Sumpsen im Walde, und ist ziemlich schwer zu betleichen. Doch habe ich schon manche in den sumpsigen Graben der hmalen Waldwege in Serdang überrascht. Regelmässig des Abends um chs Uhr kann man sie unter lautem, näselndem "Gahgak, Gahgak" über ie Gipsel der Wälder hin ihrem Schlasplatz zustreichen sehen. Das Thier ist bislang nur von Birma und Java bekannt.

SCHLANGEN UND SAURIER.

Typhlina lineata Reinward.

Nicht selten.

Cylindrophis rufa Laurent.

Haufig des Morgens auf den Landstrassen nach einem Regen, der das hierchen wahrscheinlich aus seinen Erdlöchern hervortreibt. Es fällt geöhnlich durch die sonderbaren Sprünge und Bewegungen auf, mit denen sich auf dem ihm offenbar ungewohnten Terrain umherschnellt. Die saleien nennen dasselbe Ular kapala dua, zweiköpfige Schlange, da sie as dicke Schwanzende ebenfalls für einen Kopf halten; der Umstand betärkt diesen Irrthum, dass die Schlange sich auch rückwärts schnellt und abei das Schwanzende wie einen Kopf erhebt. Ich selbst konnte oftmals ei den sonderbaren Sprüngen nicht auf den ersten Moment vorne und inten unterscheiden.

Xenopeltis unicolor Reinward.

Diese Mulmschlange kommt sehr selten freiwillig zu Tage, ist aber einahe unter jedem Schutt- und Moderhausen anzutreffen.

Coronella-Arten habe ich zwei gefunden, beide nicht selten, namlich Coronella baliodeira Boie und C. octolineata Schneider, ebenfalls unter Schutt- und Mulmhaufen.

Elaphis melanura Schlegel.

Ist sehr häufig und wird von den Eingebornen oft mit der Brillen-

schlange verwechselt. Ihr liebster Aufenthalt ist auf Wiesen zwischen den Grasbüscheln und im Grase der Wegränder.

Coryphodon korros Reinward.

Seltener. Auch diese unschädliche Schlange wird oft von den Eingebornen mit der schrecklichen Hutschlange, Ophiophagus elaps, verwechselt.

Tropidonotus trianguligerus Schlegel.

Nicht selten. Ein Exemplar habe ich in einem Wassergraben auf der Hochebene von Tobah gefangen.

Amphiesma rhodomelas Schlegel.

Ich habe nur ein einziges Exemplar gesangen; Amph. chrysargos Boie und Amph. flaviceps D. & B. bei Labuan.

Liopeltis tricolor Schlegel.

Haufig. Das Thier halt sich am liebsten auf erhabenen Puncten, alten Zaunen u. s. w. sowie niederem Gebusch auf.

Gonyosoma oxycephalum Reinward.

Nicht häufig. Ein bissiges Thier, das durch seine Färbung einem oberflächlichen Beobachter die giftige Bothrops hageni vorzutäuschen im Stande ist.

Hypsirhina plumbea Boie.

An den Ufern des Deliflusses bei Labuan bis zum Meere.

Homalopsis buccata Linné.

Die gemeinste Wasserschlange in Deli, besonders im Brackwasser der Deliflusses zwischen dem Wurzelgewirr der Rhizophoren, welche im Malaiischen bakau heissen. Daher auch der Name der Schlange: *Ular bakau*.

Homalopsis boaeformis Schneider.

Ebendort.

Psammodynastes pulverulentus Boie.

Von den Malaien *Ular sampa* genannt und als giftig sehr gefürchtet. Dieses Thierchen halt sich am liebsten auf kahlen, sandigen, sonnigen Stellen, z. B. im Staub der Strassen auf, mit dem seine Farbung gut harmonirt.

Die Baumschlangen (Dendrophiden) sind zahlreich, in sechs Arten verteen. Man wurde jedoch sehr irren, wenn man aus ihrem Namen schliesen wollte, dass die Baumschlangen ausschliesslich auf Baumen leben. Auf wirklichen, einigermassen hohen Baumen leben nur zwei Arten,

Dryophis prasina Wagler und Chrysopelea ornata Shaw. Die übrigen,

Dendrophis picta Boie und D. octolineata D. & B., sowie

Leptophis formosa Schlegel,

leben auf dem Boden und dem niederen Gesträuch; keine der letzteren babe ich auch nur in Mannshöhe gesehen, obwohl ich viele hundert von Exemplaren beobachtet habe, denn die Baumschlangen, mit Ausnahme von L. formosa sind allüberall gemein. Einmal sah ich, wie ein durch seinen schön feuerroth getupften Rücken als Mannchen sich kennzeichnendes Exemplar von Chr. ornata einen ganz glatten, über einen Meter im Durchmesser haltenden, Durianbaum hinaufstieg, dessen Aeste erst gegen 30 Fuss vom Boden begannen. Es war wunderbar zu sehen, wie die Schlange zwar langsam, aber unaufhaltsam an der glatten, senkrechten Fläche in fast gerader Richtung emporklomm ohne jeden ausserlich wahrnehmbaren Anhaltspunct, indem sie ihren Körper in eine Menge kleiner Windungen zusammengezogen hatte; ich zählte deren oft ein Dutzend in einer einzigen Stellung.

Chrysopelea hasselti Bleeker.

Das schone, feuerfarben geringte Schlanglein, welches unmittelbar an der Kuste, dagegen nicht besonders selten in den Vorbergen von mir gefangen ward, habe ich niemals klettern, sondern immer auf dem Boden gesehen, doch ist dies wahrscheinlich nur ein Zufall.

Alle erwachsenen Baumschlangen sind höchst bissige Thiere, junge Thiere dagegen nicht im mindesten; diese lassen sich ruhig und ohne einen Fluchtversuch zu machen, in die Hand nehmen und mit sich spielen.

Erwahnen will ich noch, dass ich *D. picta* und octolineata öfters Frösche und Eidechsen habe fangen sehen. Ich wurde auf die Jagd, wenn sie meinen Augen verborgen war, immer durch das jämmerliche, beständige Quacken der Gefangenen aufmerksam.

Dryophis prasina Wagler.

Lebt auch in hohen Baumwipfeln und gewährt durch ihre unendlich leichten, graziösen Bewegungen einen wunderbaren Anblick. Das Thier scheint allen Gesetzen der Schwerkraft Hohn sprechen zu können.

Den Dipsadeiden gehören vier Arten zu, welche alle im Gestrauch, aber stets ziemlich nahe dem Boden leben.

Dipsas dendrophila Reinward.

Nur die grösste und schönste Art, geht höher. Man kann diese oft wenn man im Kahn auf den Flussen dahinfahrt, auf den über das Wasser hereinhängenden Zweigen, unter denen man durchfährt, in einen Knäuel zusammengeballt, sich sonnen sehen. Sie ist fast eine Wasserschlange zu nennen, da sie sich stets in der Nähe des Wasser hält und nur im Gesträuch der Flussufer anzutreffen ist; sie besinnt sich auch keinen Augenblick, verfolgt, ins Wasser zu stürzen und Gebrauch von ihrer vortrefflichen Schwimmkunst zu machen. Mit den, im Leben prachtvoll orangegelben Bandern, wie sie z. B. Brehm in seinem Thierleben (II Aufl., VII Bd., p. 391) abbildet, habe ich das Thier in Deli niemals gesehen. Die Bänder sind bei den dortigen Exemplaren stets zu oft sehr kleinen, vereinzelten Seitenflecken eingeschrumpft.

Es ist diese Schlange ein bissiges, leicht in Wuth gerathendes Thier, das natürlich von den Eingebornen ebenfalls als sehr giftig gefürchtet wird.

Eine Schaar unserer Kulis rief mich einst nach dem Fluss, wo eine grosse, giftige Schlange gesehen worden sei. Dort angekommen, gewahrte ich auf einem einsam über das Wasser hängenden Zweige unser Thier schlafend in einen Knäuel gerollt. Auf einen wahrscheinlich schlecht gezielten Schuss stürzte sich die Schlange blitzschnell ins Wasser und schwamm behende mit wuthblitzenden Augen und züngelnd erhobenem Kopfe direct auf mich zu, sodass die neugierig herumstehenden Kulis erschreckt davonstoben. Erst ein zweiter Schuss tödtete das kampflustige Reptil, als es schon mit halbem Leibe am Lande war. Bei den Malaien heisst die Schlange Ular tiong 1).

Die übrigen ebenfalls sammtlich nichts weniger als friedfertigen Arten sind:

Tiong ist der Name eines Vogels, Eulabes javanicus, der schwarzblau von Gefieder, im Nacken zwei grosse, hochgelbe Hautlappen hat, dem daher die Schlange in ihren Farben etwas ähnelt. Vielleicht desshalb dieser Name.

Leptognathus laevis Boie,

mal. Ular ninisende,

Dipsas drapiezi Boie und Odontomus subannulatus Schlegel.

Auch die Lycodon-Arten gelten bei den Malaien für giftig und werden nit dem hauptsächlich für die Brillenschlange gebräuchlichen Namen Ular par belegt.

Ich habe drei Arten gesammelt:

Ophites subcinctus Boie, Lycodon aulicum Linné und Lycodon hebe Schlegel.

Es sind alle drei nicht gerade seltene Thiere, die jedoch tagsüber an rerborgenen Orten sich aufhalten und nur in der Dämmerung Abends md in der Morgenfrühe träge zwischen den Erdschollen oder über die Strasse kriechen, bei welcher Gelegenheit sie am ersten gefangen werden.

Python reticulatus Schneider.

Die Riesenschlange, Ular sawah der Malaien, ist überall sehr häufig, und wird besonders den Hühnerställen gefährlich. Sie ist ein Nachtthier, das nur von den späten Abendstunden an auf Raub ausgeht. Auch in Häusern hält sie sich gern auf, namentlich zwischen den Ataps der Hausdächer wo sie den Ratten nachstellt. Tagsüber liegt sie an dunklen, kühlen Orten in einen Knäuel gerollt, verborgen unter alten Brettern, Baumstämmen etc.

Die grössten Thiere, welche ich selbst getödtet und zwar mit dem Stock erschlagen habe, massen vierzehn Fuss in der Lange, doch habe ich bei Pflanzern mehreremale lebende Gefangene gesehen, die bedeutend grösser waren; glaubwürdige Europäer dort versicherten mir, dass sie schon einige Stücke von 25 Fuss gemessen haben, die an der dicksten Stelle ihres Leibes mit den beiden Händen kaum zu umspannen waren. Ihr Fleisch schmeckt bekanntlich nicht schlecht, und ward von chinesischen Kulis öfters nach Labuan auf den Markt gebracht. In dem Magen der getödteten Exemplare fand ich fast immer Ratten und andere kleine Säugethiere, oder Vögel. Dass sie grössere Thiere, ja Menschen verschlucke, will ich nicht versehlen auch meinerseits als Märchen zu kennzeichnen. Junge Wildschweine dagegen scheinen ihr wirklich hie und da zum Opfer zu fallen, wie Nachfolgendes beweisen durste, das mir von einem Herrn unserer eigenen Pflanzung mitgetheilt ward. Dieser Herr sass eines Abends mit seinem mir ebenfalls bekannten Bruder

kurze Zeit vor meiner Ankunst in Deli auf der Veranda seines Hauses, al sie plötzlich vom benachbarten Wald her ein klägliches Geschrei vernah men. Einer der Brüder geht hinüber, um nachzusehen, und wie er da Gebüsch auseinander schlägt, erblickt er eine grosse Pythonschlange, welch um einen Baum gewickelt, ein halbwüchsiges Wildschwein in ihren Rin gen zu erdrücken sucht. Er läust schnell zurück um seine Gewehr zu holen; wie er jedoch mit seinem Bruder wieder an Ort und Stelle kommt sinden sie das Schwein todt am Boden liegen, die Schlange jedoch is verschwunden. Der Herr, der zuerst hinausging, hatte die Schlange, wie er mir versicherte, absolut nicht erschreckt oder verscheucht, sondern si war leise zurückgeschlichen; es bleibt also Nichts Anderes anzunehmen als dass der Bissen für dieselbe zu gross war und sie ihn desshalb liegen liess

Wenn in der Regenzeit eine der häufigen Ueberschwemmungen ode eine Springfluth eingetreten war, welche das Land nahe der Küste weithit überschwemmte, so konnte ich oft frühmorgens, auf der grossen mit Pfut zen und Wassertumpeln durchsetzten Landstrasse oberhalb Labuan bit hinauf gegen Kampong besar, mehrere Stücke einer Acrochordus-Specie (fasciatus? Schlegel) erbeuten, welche die Fluth hieher verschlagen und zurückgelassen hatte. Sie waren sehr träge und leicht zu fangen, gewährten aber mit ihrem Bulldoggengesicht einen scheusslichen Anblick.

Acrochordus javanicus Hornstedt.

Ein fast 6 Fuss langes Exemplar von dieser Art ward auf dieselbe Weise einmal durch eine Ueberschwemmung mitten in mein dicht beim Flusse zu Labuan gelegenes Hospital, zum Entsetzen der Kranken geschwemmt Ich bemerke ausdrücklich, dass alle meine Exemplare jenseits der Brackwassergrenze im süssen Wasser des Deliflusses gefangen wurden.

Junge Exemplare waren, wie gesagt, nicht selten, auch nicht von der letzten Art, ein solch grosses Exemplar jedoch, wie das in mein Hospital geschwemmte, wollte noch Niemand gesehen haben.

Uebergehend zu den Giftschlangen, habe ich zunächst zwei Angehörige der Gattung Elaps zu erwähnen: Die erste Art ist

Elaps bivirgatus Schlegel,

ein im Ganzen nicht häufiges Thier, das ich nur einige Male im Grase unter dem Schatten eines Strauches zusammengeringelt gesehen habe und leicht mit dem Stock erschlagen konnte.

Elaps furcatus Schneider.

Diese zweite Art ist viel lebhasteren Temperaments. Man kann sie ost zus begrasten Feldwegen antressen. Beunruhigt und gereizt, richten die Thierchen, unter lebhasten Bewegungen, Kopf und Schwanz streitsertig in die Höhe, wobei sie die eigenthumliche Gewohnheit haben, das Ende des Schwanzes eine Strecke weit spiralig aufzurollen. Dadurch wird der Anblick eines weit geöffneten Rachens vorgetauscht und die Malaien nennen dese Schlange desshalb ebenfalls wie die Cylindrophis rufa, Ular kapala dua.

Bungarus annularis Schlegel.

Ein häufiges Thier. Man hat die Bungarschlange als Tagthier und trockene Orte liebend, bezeichnet; dies passt für die Ostküste Sumatra's nicht; ich bin ihr hier nur in der späten Abenddämmerung oder früh Morgens begegnet und am meisten an Orten, wo eine Strasse durch sumpfiges Terrain führte. Sie kriecht ziemlich langsam und träge dahin und macht von ihren furchtbaren Giftzähnen nicht gerne Gebrauch.

Eine Zeitlang in der Regenzeit, wenn ich fruhmorgens, ehe der Verkehr begann, auf die nasse Landstrasse oberhalb Labuan hinausging, konnte ich sicher sein, eine oder mehrere Bungarschlangen anzutreffen.

Naja tripudians Merrem, var. sondaica.

Ich komme nun zu der berüchtigtsten aller Giftschlangen, der Cobra oder Brillenschlange, mal. *Ular upar*. Die in Deli lebende Brillenschlange ereicht nicht ganz die Grösse der indischen; auch habe ich die beiden Brillenringe niemals durch ein Joch verbunden gesehen; die Farbe im Allgemeinen ist dunkler, oft bis zu tiefem Schwarzbraun. Wenn gereizt und am Beissen verhindert, schleudert oft das Thier bei geöffnetem Rachen, durch eine Compression der hinteren Schlund- und Kehlkopfmusken, seinen Speichel mehrere Fuss weit auf den Gegner, nach dessen Gesicht zielend, wie ich verschiedene Male an kreuzlahm geschlagenen Exemplaren beobachtete.

Man bezeichnet die Brillenschlange gewöhnlich als Tagthier, wird dieselbe jedoch am Tage sehr selten gewahr werden, höchstens wenn sie sich vor ihrem Schlupfwinkel sonnt. Sie scheut im Gegentheil helles Sonnenlicht und geht meines Wissens dann niemals auf Raub aus, sondern halt sich unter alten Baumstammen, Blatter- und Abfallhaufen verborgen, mit Vorliebe in der Umgebung menschlicher Wohnungen und in schlecht un-

terhaltenen Gärten. Doch auch in gut geplegten weiss sie sich zu ve stecken. Bei der jede Woche vorgenommenen, gründlichen Säuberung de meinigen konnte ich sicher sein, jedesmal ein oder mehrere Exemplat zu erhalten. Ohne diesen Beweis ad oculos hätte ich darauf geschworen dass mein Garten von diesem Ungeziefer frei sei, da weder ich noc meine zahlreichen Bedienten jemals während des Tages ein solches Thie wahrnahmen

Die Zeit der Thätigkeit für die Brillenschlangen ist ausschliesslich der spät Abend und frühe Morgen. Dann kommen sie aus ihren Schlupfwinkel hervor, treiben sich überall herum, am liebsten auf den nackten, sand gen Wegen und Strassen, und wer zu dieser Zeit ausser Hause geht, ma sich in Acht nehmen, dass er in der Dunkelheit nicht auf sie tritt, den die Brillenschlange ist ungeheuer langsam und träge und weicht dem de herkommenden Menschen nicht im Geringsten aus. Auf der Pflanzun Tandjong-Morawa musste ich eine Zeit lang des Abends zwischen 7 un 8 Uhr zum Essen von meinem Hause nach einem benachbarten gehen und hatte mich, wenn kein Mondschein war, unendlich in Acht zu nehmen damit ich nicht unversehens eine mit meinem Fuss berührte, denn e lag zu dieser Zeit immer ein und die andere unbeweglich auf der Strasse Ich konnte jedoch ganz nahe, kaum zwei Fuss weit, an ihnen vorbeige hen, ohne dass sie die mindeste Notiz von mir nahmen. Ungereizt sin sie wohl die langsamsten und trägsten aller Schlangen, welche ich stet mit meinem Spazierstock erschlug. Trifft man sie nicht gut, so richte sie sich sofort lebhaft auf, breiten ihr Halsschild aus und schauen unte lautem Zischen umher um ihren Gegner zu erspähen, dem sie dann so fort und ziemlich lebhaft zu Leibe gehen, jedoch nicht so schnell, das man nicht noch Zeit zu einem besser gezielten Schlage hätte.

Einst wurde ich zufällig Zeuge einer Begegnung zwischen einer Cobn und einer Katze am helllichten Tage. Letztere, es war meine eigene, sas auf der Strasse und starrte anverwandt auf etwas vor ihr Liegendes hin das ich für ein altes Stück Tau hielt. Da die Katze jedoch immerfor höchst sonderbar, ohne sich zu rühren, darauf hinstarrte, ging ich nähe und sah nun, dass der vermeintliche Strick eine Cobra war, welche unend lich langsam, ohne merkbare Bewegung und mit platt auf den Boden ge drücktem Kopfe, Linie vor Linie auf die Katze zukroch und sie ebenfalls fest fixirte. Ich glaube nicht, dass die Katze die minimale Bewegung und Annäherung der Schlange merkte — diese mochte in einer Viertelstunde etwa zwei Zoll Weges zurücklegen — denn sie sass ruhig und ohne ein Zeichen von Augst auf ihrem Hintertheil und schaute nur unverwandt

and die Cobra. Ich beobachtete beide Thiere beinahe eine halbe Stunde lang; dann, als die Entfernung zwischen beiden nur noch etwa einen Fuss letzug, wurde ich für meine Katze bang und jagte sie weg; ruhig drehte is sich um und ging davon, während ich die träge, ihr nachglotzende Cobra sichlug. Ich glaube, dass die beiden Thiere nur ganz zufällig ihren Weg kreuzten und dass die Cobra keine mörderische Absicht auf die zum Versthingen viel zu grosse Katze hatte.

Opiophagus elaps Schlegel.

Wenn wir die Brillenschlange als faul, trage, ja friedfertig bezeichnen massen, so ist ihr grosser, aber glücklicherweise weniger häufiger Vetter, de Hutschlange, gerade das Gegentheil. In Deli kann man oft auf Brachteldern oder über sonstige flache, kurzbegraste Strecken eine braungraue, kolossale Schlange von über zehn Fuss Länge mit der Geschwindigkeit eines Schnellzuges dahinschiessen und im Gebusch verschwinden sehen. Die ganze Erscheinung kommt so plötzlich und unerwartet und geht so schnell voruber, dass man meistens nicht Zeit hat, die Flinte an die Backe m reissen. Das ist die Hütschlange. Wehe dem armen Geschöpf, das dieser fürchterlichsten und schnellsten aller Gistslangen in den Weg kommt! Exemplare, die ich schoss, massen zwischen zehn und zwölf Fuss. Die Färbung des Thieres von Deli, gelblich graubraun oben, schwärzlich unten, mit schmutzig hochgelber Kehle, welche Färbung ich auch schon bei Jungen von noch nicht drei Fuss Länge wahrgenommen habe, stimmt mit Exemplaren von Borneo überein und dürste wieder mit ein Glied in der Reveiskette sein, welche den innigen Zusammenhang der Fauna beider Inseln darthut.

Ein alter Malaie brachte mir einst nach Labuan ein solches Unthier von 11 Fuss Lange lebend in einem alten Reissack; in der Meinung, der Sack enthalte die unschädliche, der Hutschlange in etwas gleichende Coluber korros, öffnete ich die Schnur mit welcher der Sack zugebunden war, um den Coluber herauszufangen. Man wird meinen Schreck begreifen, als plötzlich die scheussliche Hutschlange emporsprang, ihr Halsschild breitete und kampfbegierig zischte! Glucklicherweise war sie durch den plötzlichen Uebergang in das helle Tageslicht geblendet und so hatte ich Zeit, ihr mit dem für alle Fälle bereitgehaltenen Stock einen tödtlichen Schlag zu versetzen. Wie der Malaie das grosse, behende und beisswüthige Thier lebend in den Sack hatte bringen können, ist mir heute noch ein Räthsel.

Wie behende, ja rasend schnell er dahingleitet, habe ich an folgendem Fall gesehen, für dessen buchstäbliche Wahrheit ich einstehe:

Ich ging Nachmittags von einer unserer Pflanzungen auf einem rechtund links mit hohem Busch bestandenen Weg nach Hause. Da gleitet plötzlich, keine zwanzig Schritte vor mir, eine grosse Hutschlange pfeilschnell über die Strasse. Ich riss schnell meine Flinte herab, und drückte aufs gerathewohl in das Gras ab, in welchem gerade die Schwanzspitze des Thieres verschwinden wollte. Sie verschwand aber nicht, sondern blieb liegen; ich musste die Schlange also gut getroffen haben. Ich sprang hinzu, ergriff die Spitze und zog — die glatt abgeschossene mehrere Fusslange, hintere Halfte des Thieres hervor. Zu gleicher Zeit hörte ich ein Rascheln in den Zweigen über meinem Haupt, und sehe — die vordere Halfte mit dem züngelnden Kopf etwa sechs Fuss über dem Boden im Gezweige, wo sie grosse Anstrengung machte, noch höher hinaufzukommen! Das gelang aber nicht, und nach einer Minute fiel sie kraftlos und sterbend herab.

Platurus fischeri Jan.

Bei einem Spaziergang in den Waldern von Serdang, zwei volle geographische Meilen von der See, erbeutete ich einst mitten im Wald eine Seeschlange, die sich in Leiden als die sehr seltene *Platurus fischeri* entpuppte. Es ist wohl bekannt, dass die Angehörigen der Seeschlangen-Gattung *Platurus* aufs Land gehen, aber dass sie sich so weit von ihrem Element entfernen, das dürfte noch nicht oft beobachtet worden sein.

Die malaiischen Fischer fangen ihrer Aussage nach oft Seeschlangen in ihren Fischnetzen. Dann nehmen sie sie mit der Hand heraus und werfen sie wieder ins Wasser, ohne dass das Thier den Versuch macht zu beissen. Die meisten Fischer halten sie desshalb für unschädlich. Obwohl ich ziemlich hohe Belohnungen für jede Seeschlange bot und mir auch sonst alle Mühe gab, welche zu erhalten, brachte mir Niemand solche Thiere, und kann ich desshalb über die andern an der Ostküste vorkommenden Arten Nichts mittheilen; es werden wohl die namlichen sein, welche Cantor's Katalog von der Küste der malaiischen Halbinsel aufführt, nämlich:

Platurus fasciatus Wagler. Hydrophis striata Schlegel.

- " nigrocincta Daudin.
- " gracilis Shaw.

Hydrophis schistosa Daudin.

- , pelamidoides Schlegel.
- , pelamis Schlegel.

Von Vipern habe ich gefunden:

Bothrops viridis Daudin.

Und zwar habe ich mehrere Exemplare dieses Thieres in den Ataps r Bedachung meines Hospitals in Serdang gefunden. Die häufigste Viper war

Bothrops wagleri Boie.

Auch dieses Thier klettert mit Vorliebe. Im tiesen Wald habe ich es ehrmals auf niederen Büschen zusammengeringelt schlasend gesunden, od in den Häusern in den Dachsparren und Ataps umherkriechen sehen. Die Schlange, welche mich und meine Träger bei meiner letzten Reise ach dem Tobahsee des Nachts erschreckte 1), gehörte dieser Art an.

Besonders gern halt sich dieselbe auch an finstern, feuchten Orten auf, B. in den Badekammern. Mancher Europäer ist schon erschreckt woren, der beim Betreten seines Badekabinets plötzlich auf diesen unheimchen Gast stiess. Die Schlange heisst bei den Malaien Ular nanti bulan, eil von ihr die Sage geht, sie verweile je dreissig Tage an ein und enselben Orte. Veranlassung zu diesem Glauben mag der Umstand gechen haben, dass sie ein sehr träges und faules Thier ist, das sich von em einmal gewählten Platze ohne Noth nicht fortbewegt. Ein Bekannter on mir, ein Pflanzer, sah viele Tage, wenn nicht Wochen lang, hinereinander auf einem alten Baumstumpf dicht am Wege, den er täglich orbeiritt, eine B. wagleri ruhig liegen, und liess sie ungestört, da er ich Gewissheit verschaffen wollte, ob die Erzählung der Malaien Grund abe. Plötzlich sah er sie eines Tages umgeben von einer ganzen Menge Junger; die Schlange hatte dort offenbar ihre Niederkunft abgevartet. Er schlug sie nun mitsammt den Jungen todt und sandte sie mir zum Geschenk.

Es waren im Ganzen fünfundzwanzig Junge, die alle ein von der Alten total verschieden gefärbtes, grünes Kleid trugen (cf. Notes from the Leyden Museum, Vol. VIII, Note X, p. 45). Dieses Kleid behielten dieselben, als sie schon spannenlang waren. Ubergänge zu dem Kleid

i) Cf. meinen Rapport.

der Alten habe ich nicht gefunden. Grössere, jugendliche Exemplare trugen schon das vollkommene Kleid der Alten.

Eine merkwurdige, schön grune Viper mit rothem Schwanzende, uber deren Artzugehörigkeit noch nicht definitiv entschieden ist, — Herr van Lidth de Jeude im Leidener Museum hält sie entweder für junge Thiere von Bothrops sumatranus Raffl. oder für eine neue Art, die er

Bothrops hageni

zu nennen vorschlagt — fand ich verschiedene Male, aber nur im tiefsten Wald, niemals in der Nähe menschlicher Wohnungen, wie die vorige Art. Herr van Lidth de Jeude, der eine ausführliche Beschreibung des Thieres gibt (l. c. p. 53), hat nicht erwähnt eine spärliche Reihe himmelblauer, stecknadelkopfgrosser Tupfen oberhalb der weisslichen Seitenlinie. An den von mir mitgebrachten Spiritusexemplaren, nach denen er seine Beschreibung machen musste, sind dieselben gänzlich verblasst und sehr schwer zu erkennen; auch am lebenden Thier sind sie schon wegen der geringen Farbendifferenz nicht auffallend.

Das Thier besitzt furchterlich lange, hakenförmig gebogene, zurücklegbare Fangzahne und ist bedeutend lebhafter und bissiger als Bothrops wagleri. Gereizt hebt sie den Kopf empor, sperrt langsam den ungeheuern Rachen bis zur grössten Weite auf und fährt dann blindlings nach dem sie beunruhigenden Gegenstand. Ich habe gesehen, dass eine, vor Wuth ausser sich, da sie am Halse an eine Schnur festgebunden war, nach etwas suchte, wonach sie beissen könne und da sie Nichts fand, den Kopf umwandte und die langen Gifthaken mit kraftigem Biss in ihren eigenen Leib schlug. Eine halbe Stunde danach war sie todt. Der ganze Vorgang machte mir den Eindruck eines bewussten Selbstmordes.

Einer meiner Jäger ward beim Fang dieses Thieres in den Daumen gebissen; doch schwoll seine Hand nur unbedeutend an und er fühlte mit Ausnahme des natürlichen, durch die langen Zähne hervorgebrachten, keinen andern Schmerz; vielleicht, sogar wahrscheinlich, war es jedoch sein Gluck, dass die Schlange kurz zuvor mehrmals in meinen Stock gebissen hatte. Doch scheint das Gift wirklich nur ausnahmsweise tödtliche Wirkungen zu haben, da sogar die Malaien leugnen, dass man von dem Bisse sterbe.

Es ist im Gegensatze zu Indien merkwurdig, wie wenig Leute auf der Ostkuste von giftigen Schlangen gebissen werden; mir sind in meiner neunjährigen Praxis als Arzt nur zwei Fälle vorgekommen, wo ich das beissende Reptil zu Gesicht bekam und als wirkliche Giftschlange dassificiren konnte. Das eine war der eben erzählte Fall mit Bothrops lageni, das andere einer mit Elaps bivirgatus, der nur eine Anschwellung und Entzundung des gebissenen Fusses verursachte, welche nach applicirten Carbolverbanden in vier Tagen verschwand.

Ein andrer Mann, der von einer unbekannten Schlange in den Handröcken gebissen ward, zwei Tage bevor er sich in mein Hospital begab,
katte den ganzen Arm bis zur Achselhöhle unförmlich angeschwollen
mid überall blauroth sugillirt und mit grossen Brandblasen bedeckt. Ich
zweisele jedoch, ob dies eine directe Folge des Bisses war, denn bei
genauer Untersuchung sah ich, dass der Mann seinen Arm an drei
Stellen mit einer dünnen, seidenen Schnur, die durch die Geschwulst
vollkommen verdeckt war, diese Extremität ausserordentlich krästig unterbunden hatte. Nach Entsernung dieser Circulationshindernisse liessen
sowohl Röthe als Geschwulst nach und in 14 Tagen konnte ich den Mann
entlassen. Natürlich wurden ausserdem auch als Gegengist zwei Tage
lang grosse Quantitäten Alcohol verabreicht und gern genommen. Ausser
den Schmerzen im kranken Arm und einer grossen Angst vor den Folgen
des Bisses hatte der Patient sonst keine krankhasten Erscheinungen.

Von den folgenden Abtheilungen des Thierreiches habe ich weniger umfassende Sammlungen gemacht, die Liste derselben ist daher als ausser-ordentlich luckenhast zu betrachten.

Von Batrachiern habe ich einen Laubfrosch von der Gattung Rhacophorus bemerkt und in mehreren Exemplaren erhalten, nämlich:

Rhacophorus maculatus Gray.

Das Thier kann, vermittelst der grossen zwischen seinen Zehen ausgespannten Hautmembranen, grosse, weite, halbsliegende Sprünge machen. Ich habe, was Wallace in Borneo so sehr in Erstaunen setzte, ebenfalls mehrmals gesehen, dass nämlich ein solcher Frosch von einem hohen Baume in schieser Richtung halb sliegend herabschwebt, zu vergleichen etwa mit dem Schwebesing der Flugeichhörnchen.

Eine Kröte,

Bufo asper Gravenhorst,

kroch nach jedem hestigen Regenguss in grosser Menge auf den nassen Wegen umher.

Die Pfützen um die Häuser, sowie die Abzugsgräben derselben belebt bei trübem und feuchtem Wetter, eine unausstehlich quackende Froschgesellschaft, deren mitgebrachte Exemplare sich jedoch so schlecht er halten hatten, dass eine Bestimmung nicht mehr möglich war. Die Frösche nennen die Malaien Katäk, die Kröten Katäk būrū (Warzen- oder Beulenfrosch).

Ferner konnte ich oft von meinem Hause aus, bei einbrechendem Abend, den aus den Wäldern hervorklingenden, weithinschallenden, melancholischen Ruf einer, der gewaltigen Stimme nach zu schliessen, riesenhaften Unke hören, die nur im abgelegensten Dickicht des Urwalds hausen soll und von den Malaien onomatopoetisch Katäk betong genannt wird. Der Ruf klingt nämlich wie ein dumpfes: "Tong, tong" oder "Gong" und ist nur des Abends zu hören.

Unter den Sauriern gebührt dem Krokodil der erste Platz.

Crocodilus biporcatus Maller.

Dieses Thier, mal. Boaja, ist an den Mündungen aller Flusse und am Seestrand ausserordentlich häufig und geht in einzelnen Exemplaren die grösseren Flüsse hinauf bis fast an den Fuss der Gebirgskette. Ob dieses Flusskrokodil eine andere Art ist, kann ich nicht sagen, da ich noch keines gesehen habe; die in den Flüssen bei Medan und Tandjong-Morawa, also ziemlich weit unten, gefangenen Thiere waren jüngere Exemplare von Crocodilus biporcatus. Die Malaien behaupten, das Krokodil in den höheren Strecken sei ein anderes und nennen es Boaja kätäk, d. i. Froschkrokodil.

Bei Labuan habe ich sie in ihrem Thun und Treiben vielfaltig beobachtet. Zur Ebbezeit gehen sie heraus auf den entblössten Schlamm, wühlen sich dort ein täglich besuchtes Bett aus, in welches sie sich mit gekrümmtem Schwanz einlegen, sodass dem Vorüberfahrenden kaum die Rückenzacken sichtbar bleiben und man gar häufig, selbst bei gespannter Aufmerksamkeit, an einem solchen Lager unwissentlich vorbeifährt. Manche Krokodile legen sich dies Bette unmittelbar am Wasserrande, manche jedoch auch zehn bis fünfzehn Fuss davon entfernt unter den ersten Rhizophorenbäumen an, in deren Schatten sie noch viel weniger zu bemerken sind; manche klettern auch oft ein 10-12 Fuss hohes Ufer fast senkrecht hinauf und lagern sich dort oben ein, um bei Gefahr blitzschnell sich herab ins Wasser zu stürzen. Diese Platze sind stabil und werden nicht verlassen, selbst wenn sie tagelang nacheinander dort beunruhigt und angeschossen werden. So kannte ich, und noch besser mein Freund H., der sich aus der Krokodiljagd eine Specialität gemacht hatte, die meisten dieser Lagerplätze, und wusste genau, da

und da lagert während der Ebbezeit das und das Krokodil. Merkwürdig ist die allgemeine Behauptung der Malaien, dass mannliche Krokodile niemals aufs Land gehen, da sie sonst beim Dahingleiten über den Boden ihren nach vorn vorstehenden, harten Penis abbrechen oder beschät digen würden. Thiere, die noch nie durch das Feuergewehr beunruhigt wurden, sind nicht im mindesten scheu, und lassen, besonders die jungen, den Jäger ruhig ganz nahe herankommen. Solche jedoch, die desen nähere Bekanntschaft schon gemacht haben, werden so ausserordentlich vorsichtig und furchtsam, dass man sie selten mehr überlisten kann.

Das Krokodil ist jedoch an den Mündungen aller Flüsse so häufig, dass es nie an Neulingen und Unerfahrenen fehlt. Ich habe im Delta des Deliflusses sehr oft an einem einzigen Morgen zehn bis zwölf Stück zum Schuss und über dreissig Stück zu Gesicht bekommen.

Das grösste Exemplar, das ich geschossen habe unter vielen Dutzend, war 13 Fuss lang. Es sollen jedoch alte Stucke bis zu funfzehn Fuss Länge vorkommen. Ein Krokodil von 11 Fuss Länge, das ich zusammen mit Herrn H. von Labuan in seinem Bette schoss, hatte nur ein in allen Theilen vollkommen wohl erhaltenen Molukkenkrebs, *Limulus* Sp., im Leibe.

Wir schossen das Thier im Delistusse, eine gute engl. Meile oberhalb der Mundung. Da der Molukkenkrebs ein ausschliesslicher Meeresbewohner (an der Ostküste Sumatra's ausserordentlich häusig) ist, so muss ihn wohl die Fluth so weit herauf ins Brackwasser geschleppt haben; ich glaube wenigstens nicht, dass das Krokodil seine Ausstüge bis an die Flussmundung ausgedehnt hat.

Menschen werden sehr oft von ihm geraubt, meistens Malaien, deren flache, niedere Kahne (Sampans) auf deren ausserstem Rand, kaum einige Zoll über dem Wasser, die Steuerer sitzen, die beste Gelegenheit hiezu bieten. Dies geschieht so schnell, dass die Mitsahrenden erst an dem steuerlosen Hin- und Hertreiben des Sampan das Unglück gewahr werden.

Zu Tandjong-Morawa am Serdangflusse, einige deutsche Meilen von der See, hatte kurz vor meiner Ankunft ein Krokodil ein Kind verschlungen. Bald darauf fing man den Missethater und fand in seinem Magen noch den silbernen Armreif des Kindes. Andrerseits war ich an der Seeküste bei Serdang wieder Augenzeuge, wie einige Freunde von mir, durch die kühle Fluth verlockt, eine Viertelstunde lang sich lustig badend vergnügten genau an derselben Stelle, wo eine halbe Stunde nachher drei kleine mit einem alten Krokodil um sich zu sonnen ans Land stiegen.

In Deli kommen viel mehr Menschen durch Krokodile als durch an-

dere wilde Thiere ums Leben; und doch, wenn man bedenkt, wie taglig, stundlich hunderte und aber hunderte von Menschen ohne die geringste Furcht, zur Ebbezeit im seichten Wasser herumlaufen, um Muscheln zu sammeln oder Fische zu fangen, ja wie das ganze Leben der
Malaien sie auf dieses Terrain zu ihrem Lebensunterhalt hinweist, so
kann man sich nur wundern, dass der Fälle, wo Menschen dem Krokodil zum Opfer fallen, verhältnissmässig so wenige sind.

Der Umstand hilft wahrscheinlich hiezu mit, dass ein solches Krokodil, welches "sala" (Schuld) auf sich geladen und Menschensleisch verkostet hat, sobald wie möglich durch Legen von Angeln, unter allerlei aberglaubischen Zeremonien weggefangen und getödtet wird. Den Malaien sind die streng abgesonderten Reviere der einzelnen, alten Thiere und ihre Lieblingsplätze zu Wasser und zu Land genau bekannt, und wird einer ihrer Kameraden weggeholt, so wissen sie genau, welches Thier den Frevel begangen hat. Die alten Krokodile leben fast immer vereinzelt, finden sich jedoch an gewissen Stellen zu Ebbezeit von allen Seiten her auf einer Sandbank zusammen. Jüngere Thiere halten sich öfters bis zu sechs Stück zusammen.

Mensch und Krokodil leben also in Deli, einzelne Missethater ausgenommen, im Ganzen ziemlich friedlich beisammen, ja, ich glaube entschieden, dass das Krokodil dem Menschen aus dem Wege geht, wenigstens am Tage. Ich könnte sonst nicht begreifen, wie sich täglich so viele Menschen unbehelligt in den von Krokodilen notorisch wimmelnden Gewässern umherbewegen. Die meisten Opfer sind denn auch, so viel ich in Erfahrung brachte, zur Abend- oder Nachtzeit aus ihren Sampans geholt worden.

Schlecht angeschossen, macht das Krokodil augenblicklich einen Satz und stürzt sich ins Wasser, indem es mit seinem Schwanze um sich schlägt und dadurch den Schlamm aufwühlt, was für den Flüchtling in sofern von Vortheil ist, als dadurch das Wasser auf eine grössere Strecke hin schnell undurchsichtig wird.

Der beste Schuss ist ins Rückgrat, wodurch die Thiere sofort gelähmt werden und sich keinen Fuss weit mehr bewegen können. Ein solcherart getroffenes Thier hebt Kopf und Schwanz hoch empor, sperrt den Rachen auf, als wollte es ein Jämmergebrüll ausstossen, doch kommt kein Ton über seine Lippen, und verbleibt so oft eine Minute lang in dieser Stellung. Dann sinken Kopf und Schwanz langsam nieder, der Rachen klappt schallend zusammen and das Unthier liegt da, zu jeder Bewegung unfähig. Nicht in das Gehirn oder Rückgrat getroffene, wenn auch mitten

archs Herz geschossene Thiere haben regelmässig noch die Kraft, sich is nebenan befindliche Wasser zu stürzen und sind dann für den Jager rioren, da sie sofort untersinken, und nicht eher wieder zum Vorschein men, bis nach einigen Tagen die Gase den verwesenden Leichnam in die Oberfläche heben. Desshalb ist es auch ein nutzloses Beginnen, ist Krokodile im Wasser zu schiessen, überdies bietet ein schwimments Krokodil, von dem nur die höchsten Theile des Kopfes und der ückenzacken unmerklich aus dem Wasser ragen, auch einen sehr schlechn Zielpunct und es taucht gewöhnlich schon auf weitere Entfernung inz langsam und verstohlen, ohne die geringste wahrnehmbare Bewegung, i Wasser unter.

Naturlich besitzt auch das Krokodil in den Augen der Malaien, denen zu Mantel des Islam nur dürftig ihre frühere Hinducultur verdeckt, nen gewissen Heiligenschein. Die Verehrung geht jedoch nicht soweit, ass man die Thiere hegt oder füttert; man lässt sie nur in Ruhe, so nge sie brav sind und keine sala begehen; Menschenfresser werden, ie gesagt, unter abergläubischen Ceremonien und Zaubersprüchen gengen.

Ein solches, gewissermassen heiliges Krokodil hat seinen Standplatz if einem kleinen Inselchen, Kramat peting kepak, in der Mündung is Delifiusses, worauf sich das Grab eines malaiischen Heiligen befinen soll; es ist ein vielbesuchter Wallfahrtsort für die Malaien, und das Irokodil, welches an einem Idjukstrick um den Hals kenntlich sein il, stellt gewissermassen den Wächter dieses Kramat vor.

Man brachte mir einst ein altes, fast zwölf Fuss langes Krokodil, das inen Malaien aufgefressen hatte und zur Strase das geangelt worden zur, lebend, die Füsse auf den Rücken geschnürt, den Rachen zugeunden und die Schwanzmuskeln durchgehauen, in einem Kahn ans laus. Als man es herauszog, drehte sich das Thier, dem keine andere levegung übrig blieb, mit grosser Schnelligkeit zwanzig- bis dreissigmal later dumpsem Stöhnen um sich selbst. Draussen liess ich es mit einem tarken Strick um den Leib an einen mannsdicken Baumstamm sestbinien und die Beine lösen. Der Rachen blieb aus Vorsicht zugebunden. Leber Tag betrug es sich vollkommen apathisch und gleichgültig gem Alles und blieb wie ein Baumstamm unbeweglich auf einem Fleck iegen. Sobald jedoch die Dunkelheit eingetreten war, musste es allem Anschein nach fürchterliche Anstrengungen zu seiner Besreiung versuchen; wir zahen des Morgens die Spuren derselben, und hörten mehrere Nachte hindurch in unserm gut füns Minuten entsernten Hause sein, die ganze

Nacht dauerndes, stöhnendes Gebrüll, das einem entfernten Ochsengebrüll glich, sodass ich, da meine Hausgenossen sich über die gestörte Nachtruhe beklagten, in der vierten Nacht, als es sein Conzert aufs neue beginnen wollte, ihm eine Kugel durchs Herz jagte.

Ueber die Dicke des Krokodilpanzers wird viel gefabelt; ich kann aus vielfacher Erfahrung versichern, dass jede Büchsenkugel jeden Theil des Panzers durchschlagt

Die Farbe junger, frisch aus dem Wasser gestiegener, feuchter Thiere ist so eigenthumlich, bräunlich und grunlich gewässert, dass ich verschiedene Male darauf geschworen hätte, dieselben seien durchsichtig wie das Meerwasser, aus dem sie hervorkamen. Dieser Umstand rettete auch verschiedenen im Anfang das Leben, da ich sie, obwohl sie lang und breit ungeschützt auf dem flimmernden Strande lagen, nicht eher erkannte, als bis es zu spät war.

Ein ungelöstes Räthsel blieb mir, wohin die vielen Krokodile, welche mit der Fluth auf den Meeresstrand bei Serdang herauskamen, bei der Ebbe, die auf eine halbe Stunde weit kahle Schlammfelder blosslegte, sich zurückzogen, ob sie sich in den Schlamm eingruben oder den zurückweichenden Fluthen in das Meer hinaus folgten. Ich glaube eher das Letztere, denn niemals haben meine Augen die geringste Bewegung auf diesen Schlammfeldern gesehen, und ferner wateten auch die malaiischen Fischer und Muschelsammler schaarenweis mit Frau und Kind darin herum.

Haben wir dem Krokodil die erste Stelle eingeräumt, so gebührt gewiss dem Bedwak oder, corrumpirt, Béva genannten

Varanus salvator Laurent

die zweite Stelle.

Die Bedwak ist überall zu finden, sowohl im Wasser und an den Ufern der Flüsse, als im tiefsten Urwald und in den Gipfeln hundertfünfzig Fuss hoher Bäume. Ich habe eine solche Eidechse einmal im Wald einen der dicksten Stämme mit völlig astloser, aalglatter Rinde bis zu der schwindelnden Höhe von mehr als hundert Fuss senkrecht hinaufklettern sehen und dann von dort herabgeschossen. Was das Thier dort hinauflockte, ist mir ein Räthsel geblieben.

Wie gut sie klettern, habe ich verschiedene Male zu meinem Aerger erfahren. Ich hatte die Scelette meiner geschossenen Thiere praeparirt und sie in die Bäume nahe bei meinem Hause gehängt zum Trocknen. Nach kurzer Zeit fand ich allmorgendlich die Stricke durchgebissen, die Sce

lette am Boden liegend und halb aufgefressen. Ein paar Nächte Aufpaszus lehrten mich die Uebelthäter in einem Pärchen Bedwaks erkennen. and bestrafen, sodass ihre Scelette bald neben den andern hingen. Auch den Huhnerstallen statten die frechen Rauber, wie alle Pflanzer schon efahren haben, haufige Besuche ab, ja sie richten dort mehr Schaden m, als der Musang und die Riesenschlange. Wenn man des Nachts das ängstliche Gezeter im Huhnerstall hört, so wird man unter siebenmal sicher viermal die Bedwak, zweimal den Musang und vielleicht cinmal die Pythonschlange entdecken. Unsere Eidechse ist ausserordentlich behend und schlau bei ihren Raubzugen und weiss sich durch die engsten Gitter durchzudrücken. Trotz der grossen Häufigkeit auf dem Lande, in der Nahe der Hauser und im Walde, ist aber doch eigentlich das Wasser und die Flussuser, namentlich die Rhizophorensumpse der Flussmundungen, ihre eigentliche Heimath. Soweit das Brackwasser des Deliffusses z. B. reicht kann man bei einer Kahnfahrt ein halbes Dutzend dieser Thiere auf dem Schlamm oder dem Wurzelgewirr der Mangrovebusche liegen sehen und leicht schiessen. Verwundet, und venn ihr der Weg nach dem Wasser nicht abgeschnitten ist, stürzt sich die Bedwak am liebsten in die Fluth. Sie schwimmt und taucht vortrefflich, und wurde dem Jager unbedingt verloren sein, wenn sie nicht alle Minnten genöthigt wäre, zum Athemschöpfen an die Oberfläche zu kommen. Ein aufmerksamer Beobachter im Kahn wird sie immer bald vieder erblicken, schnell darauf zurudern, ihr den Weg nach dem Land verlegen - denn wenn die Bedwak merkt, dass sie auch im Wasser verfolgt wird, sucht sie wieder ans Land zu kommen - und sie schliesslich, wenn sie mude wird, und nicht mehr so schnell tauchen kann, entweder durch einen Schlag auf den Kopf oder einen zweiten Schuss in seine Gewalt bringen.

Von der Frechheit des Thieres möge folgendes zeugen: Es ist mir mehrere Male vorgekommen, dass ich vom Boote aus Vögel schoss, die zwischen die Mangrovewurzeln des Ufers oder ein Stückchen weiter ins Land hinein herabfielen. Ich setzte dann meine Malaien ans Land, um die Beute zu holen. Da hatte aber schon eine Bedwak den Vogel im Rachen und lief mit ihm davon, so schnell sie ihre Fusse tragen wollten. Mein Jager hinterher, hatte oft grosse Mühe, das Thier einzuholen und musste sich beinahe mit demselben um die Beute balgen, was nicht ohne Schmerzensschrei von seiner Seite abging, denn die Bedwak bemutzt ihren langen, peitschenartigen Schwanz, um tüchtige, wohlgezielte und lautklatschende Schläge damit auszutheilen. Auch an Gefangenen,

die ubrigens lange ohne Nahrung in träger Ruhe daliegend, aushalten habe ich dies oft beobachtet. Man durfte den Thieren nie, wenn auch noch so verstohlen, nahen. Aufmerksam folgten ihre Aeuglein den Bewegungen, fast unmerklich drehten sie das Hintertheil nach dem Nahen den zu, wogen bedächtig die Entfernung ab und — schwupp! hatte mar einen kräftigen Peitschenschlag weg.

Auch die Bedwak steht bei dem Malaien, mehr aber noch bei den Batta, in einem gewissen Geruch der Heiligkeit, was aber den letzterer nicht im Geringsten abhalt, ihr gar nicht übel schmeckendes Fleisch und ihre Eier zu verzehren. Bilder derselben sieht man häufig von den Battas sowohl auf profanen als religiösen Gegenständen geschnitzt. An den Orten, wo die Malaien gewisse Opferseste, verbunden mit Schlachten von Hühnern und Ziegen, zu begeben pflegen, gewöhnlich auf einer vor springenden Stelle des Flussusers, leben immer eine oder zwei dieser grossen Eidechsen, ost Exemplare von über sechs Fuss Länge, die gewissermassen halb zahm sind und herbeikommen, um das Blut der Opserthiere aufzulecken. Niemand wagt es, diesen Thieren etwas zu leide zu thun

Die Bedwak lebt immer einsam.

Von Sauriern habe ich sonst noch gefunden:

Hemidactylus frenatus Duméril et Bibron,

ein kleiner, bräunlich fleischfarbener Gecko, der in allen Häusern ausserordentlich häufig ist. Sein Geschrei ist ein helles: "Gluck-gluck-gluck-

Platydactylus guttatus Daudin.

Etwas weniger haufig.

Ptychozoon homalocephalum Creveldt.

Nicht besonders häufig, und meist nur in unbewohnten Gebäuden, alten Scheunen, Ställen etc. Das arme, allerdings etwas abenteuerlich aussehende Thierchen steht unschuldigerweise im Geruche grosser Bissigkeit und Giftigkeit.

Calotes cristatellus Kuhl.

Dieses Chamaleon ist auf allen Buschen sehr gemein, und steht naturlich bei den Malaien ebenfalls im Geruche der Giftigkeit. Es ist ein bissiges Thier, das seine schöne, grasgrune Farbe im Nu in ein schmutziges Braun verwandeln kann. Namentlich thut es dies, wenn es gereizt wird, z. B. durch Stockschläge. Es war mir auffallend, dass die Thiere

mitten in den grunen Blattern, wenn ich sie mit dem Stock todtzuschlagen versuchte, immer das mit der grunen Umgebung gar nicht harmomende Braun annahmen. Ich hatte eher geglaubt, dass sie gerade jetzt in der Noth die grune Farbe nöthiger hatten, um sich zu verbergen.

Draco volans Linné.

Der sliegende Drache ist sehr haufig, aber schwer zu beobachten, da er erstens nicht gross ist, und zweitens seine Färbung ausserordent-Ich gut mit der Baumrinde harmonirt, an der er rastlos stossweise auf und abklettert.

Zum Fluge entschliesst er sich nicht oft, ist aber doch im Stande, einen zehn Schritte entfernten Baum in nur wenig geneigtem Flug zu erreichen.

Eine zweite Draco-Art, die noch nicht bestimmt ist, ist um ein beträchtliches grösser.

Zwischen den durren Blättern auf dem Boden des dunkeln Urwaldes, und ausschliesslich nur dort, aber ziemlich häufig, läuft behende ein langbeiniger, hellbrauner

Otocryptes

herum, der wohl, wie Herr van Lidth de Jeude vermuthet, eine neue Art sein wird.

Ausserdem habe ich an denseben Orten einen ebenfalls hellbraunen

Scincus

bemerkt und gefangen, der ebenfalls noch der Bestimmung harrt. Er war nicht häufig.

Dagegen ist, wie überall in jenen Ländern, so auch in Deli,

Scincus sebae Duméril et Bibron,

ein gemeines Thier, das selbst etwas klettern kann. Auch dieses Thier kann seine gewöhnlich tiefbraune Farbe einigermassen verändern, nämlich in schmutzig olivengrün, sein hellerer Bauch wird sogar mamhmal schmutzig grasgrün. Doch braucht es zur Verwandlung längere Zeit als der Calotes. Ich habe dies namentlich bemerkt, wenn das Thierchen, aus dem Grase kommend, einen Baum hinaufklettern wollte.

Sehr selten scheint

Euprepes olivaceus Gray

m sein. Ich habe nur zwei Exemplare gefangen. Ein Pärchen hieher ge-

höriger, fingerlanger Thiere, braun mit grossen orangefarbenen Flecken und Zeichnungen, ging leider bei der Versendung verloren; ich kann desshalb über die Species Nichts mittheilen.

INSEKTEN.

Lepidoptera.

A. Rhopalocera.

I. NYMPHALIDAE.

I. DANAINAE.

Die Familie der Danaiden, und zwar die Gattungen Danais und Euploca sind es, welche vornehmlich der Ostküste Sumatra's ihren Stempel aufdrücken, sowohl durch ihre ungemeine Häufigkeit und Grösse, verbunden mit oft sehr schöner Färbung, als durch den Umstand, dass sie vorzugsweise die bewohnten Oertlichkeiten befliegen und sich am liebsten mit ihrem langsamen Fluge um die Abfallstätten der Häuser und Ställe, sowie um die niedere Flora der Wegränder und Brachfelder herumtreiben. Besonders gern drängen sie sich um eine dem bekannten Heliotrop sehr ähnliche, aber geruchlose Blüthe in solchen Schaaren, dass man öfters 5—6 Arten beider Gattungen mit einem Zuge ins Netz bekommen kann. Keinen Vogel oder irgend ein anderes Thier habe ich je einen dieser Gruppe angehörigen Falter verfolgen oder verzehren sehen, trotz ihrer ausserordentlichen Häufigkeit und ihres langsamen, etwas schwerfälligen Fluges. Wie uns Herr Wallace erzählt, sind sie durch einen eigenthümlichen Geruch und Geschmack für die Vögel ungeniessbar.

Euploea.

1). Midamus Linné. Auch ich habe bemerkt, dass meine Exemplare von Deli, ebenso wie die Snelleman'schen von Westsumatra 1) beträchtlich grösser waren, als die von mir in Java gesammelten; gewöhnlich findet das Umgekehrte statt.

Die var. mulciber Distant. (Rhopalocera malayana, Tab. III, Figs 1, 2,) habe ich von meiner zweiten Reise nach der Hochebene von Tobah mitgebracht und auch in Deli einige Exemplare gefangen. Nach Distant, l. c., p. 25, ist diese Varietät "the constant Bornean race or form of E. midamus and peculiar to that island." Er beschreibt noch ein einziges Q Exemplar mit (zweifelhafter) Herkunft von Malakka. Wie man sieht,

¹⁾ Cf. Die Publication der "Midden-Sumatra-Expedition", Abtheilung: Schmetterlinge.

mess man die Verbreitung dieser Varietät auch auf Sumatra ausdehnen.

- 2). Bremeri Felder. Nicht gerade sehr häufig. Von der Hochebene von Totah habe ich einen of mitgebracht, bei dem die Hinterecken der Vorderflugel etwas stärker ausgeschnitten sind als gewöhnlich; auch fehlen bei ihm die weissen Puncte in Zelle 10 und an der Wurzel von Zelle 3. Auf der Unterseite der Hinterflugel ist das vordere Ende der Discoidalzelle meist nur von fünf weissen Puncten umgeben.
- 3). Distanti Moore. Dies ist das gemeinste Thier, das überall des Wanderers Fuss umgaukelt.

Bei meinen of Exemplaren sind sehr oft alle die Tupsen und Puncte, welche Distant als für das Q characteristisch angibt, ganz oder theilweise worhanden, nämlich ein weisser, durch eine seine, braune Linie getheilter Fleck unterhalb des dritten Medianastes als Fortsetzung der submargmalen Fleckenbinde, dann ein weisser Punct zwischen 1. und 2. Subcostalnerven, einer zwischen erstem und zweitem, einer zwischen zweitem und drittem Mediannerven (sowie sogar östers noch eine Andeutung zwischen dem untern Discoidal- und erstem Mediannerven) und endlich ein Punct im untern Ende der Zelle. Auch die submarginale Fleckenbinde der Hinterstügel ist gewöhnlich sehr deutlich und scharf; die einzelnen Flecken, wie beim Q, eisörmig oval.

Beim of ist ferner auf der Unterseite der Hinterstügel der bleichviolette Punct im Ende der Mittelzelle nicht von sechs, sondern stets nur von sun Functen umkranzt, beim Q jedoch immer von sechs, ost sogar von sieben.

- 4). Acceptus Butler. Auf der Hochebene von Tobah gefangen. Snelleman hat das Thier auch auf der Westkuste gefangen. Cf. die Abb. in dem Werk der "Midden-Sumatra-Expedition."
- 5). Species. Eine noch unbestimmte Art, die ich in zwei of Exemplaren erhielt.
- 6). Pinwilli Godardt. Häufig. Meine Deli-Exemplare besitzen öfters noch in Zelle 6 und 7 auf der Unterseite der Vorderflügel je einen bläulichweissen Punct.
 - 7). Menetriesii Felder. Ziemlich selten, bis auf die Hochebene hinauf.
- 8). Ochsenheimeri Lucas. Diese grosse Art liebt weniger das freie Sonnenlicht, als schattige Platze; ich habe die meisten Exemplare auf schattigen Waldwegen gefangen. Nicht sehr häufig.
 - 9). Rhadamanthus Horsfield. So häufig der Mann, so selten das Weib.
- 10). Ledereri Felder. Auch ich habe unter hundert Mannchen, kein einnges weibliches Exemplar gefangen. Der Schmetterling ist einer der hau-

figsten, besonders in der Umgebung von Labuan. Die bläulichen Punct am Ende der Mittelzelle und oberhalb der Wurzel von Zelle 6 sind be meinen Exemplaren sehr inconstant.

11). Novarae Felder, vestigiata Butler. Ziemlich selten. Ein in Deli ge fangenes Q zeigt nur 4 blaue Flecke auf der Oberseite der Vorderflugel nämlich 3 kleine, submarginale in Zelle 6, 5 und 4, und den länglichen unterhalb des 3. Mediannerven, sowie die Andeutung eines submargina len Fleckchens in Zelle 2.

Danais.

- 1). Similis Linné, Radena vulgaris Distant. Ueberall gemein.
- 2). Agleoides Felder. Ueberall gemein.
- 3). Aspasia Fabricius, var. crocea Butler. Ebenfalls. Meine Q von Del messen in der Lange der Vorderflugel nicht mehr als die O, namlich 40 Mm
- 4). Limniace Cramer. Häufig, bis auf die Hochebene von Tobal hinauf. Die Exemplare sind ziemlich klein; keines hat über 100 Mm Flügellänge, und die Zeichnung ist eben beschränkt wie gewöhnlich be sumatranischen Exemplaren.
- 5). Melaneus Cramer. Fast bei allen Deli-Exemplaren ist der Apex be trächtlich ausgezogen, sodass dieselben beträchtlich grössere Spannweith haben als z. B. Exemplare, welche ich in Java sammelte. Die Deli-Exemplare messen Flugellange of 45 und 46, die Q 49 Mm., javanische of nu 40 Mm. Ferner ist die Farbe der Deli-Individuen durchweg nicht dat Dunkelschwarz der javanischen, sondern mehr ein verwaschenes Schwarz lichbraun, welches oft namentlich am Hinterrand der Vorderflügel und auf den Hinterflügeln einen rostfarbigen Anflug hat. Auf den Hinterflügeln ist die submarginale Punctreihe deutlich ausgeprägt, ebenso setzter sich auch auf der Oberseite die subdiscalen, drei weissen Puncte is einer regelmässigen Reihe bis zum Analwinkel fort.

Mit diesem Habitus bilden die Deli-Individuen einen leichten Ueber gang zu einer Varietät, welche ich in beiden Geschlechtern auf der Hoch ebene von Tobah gefunden habe, und welche sehr stark der *D. titye* Gray gleicht, nur ist sie bedeutend kleiner; die Exemplare meiner Va rietät haben 48 Mm. Flugellange, die von *D. titya* 55 Mm. Die Mittelzelle der Vorderflugel ist bei meinem Q Exemplar in der costalen Halfte schwärzlich berusst, die submarginale Punctreihe fehlt. Auf den Hinterflugeln ist das Rostbraun der aussern Halfte nicht so lebhaft wie bei titya, sondern etwas bleicher und geht gegen den Aussenrand hin in dunkles Kaffeebraun über; die fünf Flecke, welche das Ende der Mittel-

Zelle umgeben, sind gegen den Aussenrand auf der Oberseite nicht scharf abgegrenzt, sondern verwaschen. Von den subdiscalen, weissen Flecken ist oben nur ein einziger zwischen dem zweiten Subcostal- und dem Discondalnerven zu sehen; auf der Unterseite ist noch ein zweiter oberhalb des 2. Subcostalnerven, sowie Andeutungen solcher gegen den Analwinkel hin, und eine Reihe feiner, submarginaler, weisslicher Puncte. In allem Uebrigen ist die Zeichnung gleich D. titya. Ich schlage für diese interessante Varietat, die nur auf der Hochebene von Tobah vorkommt, den Namen var. tityoides vor.

- 6). Genutia Cramer. Sehr häufig, aber nie in der typischen Form, sondern stets in der von Distant (Rhop. mal., Tab. II, Fig. 3) abgebildeten Varietät, welche das Roth der Hinterflügel stark mit weiss gemischt hat. Bemerken möchte ich noch, dass der weisse Punct an der Wurzel von Zelle 2 nicht blos unten, sondern sehr häufig auch oben deutlich sichtbar ist.
- 7). Melanippus, var. hegesippus Cramer. Ebenfalls nicht selten, z. B. bei Labuan, aber doch nicht so allgemein wie die vorige Art.

Ideopsis.

1) Daos Horsfield und Moore. Ueberall nicht selten, doch bevorzugt das zarte Thierchen mit seinem langsamen, schwerfalligen Fluge schattige, geschutzte Platze.

Hestia.

1). Lynceus Drury. Häufig, aber nur in schattigen Wäldern, da das Thier die Sonne zu scheuen scheint. Es fliegt ungemein unbeholfen und langsam, da die schwachen Muskeln offenbar die ungeheuren Flügel nicht gehörig regieren können. Ein mässiger Luftzug schon treibt den Schmetterling willenlos wie ein Stück leichten Papieres hin und her. Aus diesem Grund auch glaube ich, dass sich die Art allein in den stillen, vor Wind geschützten Wäldern hat erhalten können.

2. SATYRINAE.

Melanitis.

Die Thiere dieser Gattung sind meist sehr häufig und fliegen stets siedrig und auf kurze Strecken zwischen niedrigem Gebüsch und im Grase. Sie setzen sich ausschliesslich auf den Erdboden, mit zusammengefalteten Flügeln und sind dann nur schwer von diesem zu unterscheiden.

Bluthen habe ich sie nie besuchen sehen, dagegen trifft man sie in Schaaren an abgefallenem, fauligem Obst, besonders Feigen, am liebsten früh Morgens oder spät Abends. Wenn alle andern Schmetterlinge noch oder schon schlafen, um 6 Uhr des Morgens oder Abends, dann halten unsere Thiere schon ihre Mahlzeit.

- 1). Leda Linné. Gemein bis auf die Hochebene von Tobah hinauf. Das Thier variirt ausserordentlich Herr Butler hat ja seinerzeit ein und vierzig Abarten beschrieben und an den Exemplaren, welche ich von Deli und der Hochebene besitze, kann ich alle die Formen der Ocellen, welche Darwin in seiner "Abstammung der Menschen" (Uebers. v. Carus, Bd. II, p. 124) abbildet, wiederfinden. In der Kustenebene ist die haufigste Form die typische leda, höher hinauf in den Bergen und auf der Hochebene vertritt sie die Form, welche unter dem Namen
 - 2). Ismene Cramer bekannt ist; diese variirt noch mehr als leda.
- 3). Suyudana Moore. Entsprechend seiner dusteren Färbung, lebt dieses Thierchen gewöhnlich nur in den dunkelsten Dickichten der bebauten Ländereien zwischen den Grasbüscheln auf der Erde, und kommt nicht überall vor. Ich habe dasselbe bei Tandjong-Morawa, in Serdang, in einem dunkeln Bambugebüsch zusammen mit Erites Arten, und bei Labuan in dunkeln Baumgärten gefangen. Die suyudana steht noch früher auf als leda; ich habe dieselbe oft schon um 5 Uhr Morgens an den faulenden Feigenfrüchten schmausen sehen. Wenn leda erscheint, zieht sich die andere schon gesättigt zurück spätestens gegen 8 Uhr und ist dann bis zum späten Abend nicht mehr zu sehen. Diese Art variirt am wenigsten.

Lethe.

Diese Gattung kommt nicht in der Küstenebene vor, mit Ausnahme von Lethe mekara.

Die Thiere sind nicht so an die Erde gebunden wie die vorhergehende Gattung, sondern setzen sich auch an Grasstengel und niedere Büsche. In den Vorbergen, zwischen 800—1500 Fuss Höhe, habe ich:

- 1). Europa Fabricius, aber nur in wenigen Exemplaren gefangen. Ein on hatte 35 Mm. Flugellänge.
 - 2). Arete Cramer. Selten, in derselben Gegend.
- 3). Chandica Moore. Ich erhielt nur ein einziges Exemplar, von der Hochebene aus dem Karo-Gebiete.
- 4). Rohria Fabricius. Nur auf die Hochebene von Tobah beschränkt, aber dort in den grossen, baumlosen Lalangsavanen stellenweise ausserordentlich

hanig und für die Laudschaft characteristisch. Auf meiner ersten Reise nach dem Tobahsee, im August 1881, sah und erhielt ich nur 2 Exemplare, fand den Schmetterling jedoch auf meiner zweiten Reise, Dezember 1883, sehr gemein und überall.

5). Mekara Moore. In den Vorbergen bis 1000 Fuss Höhe ziemlich hänfig, aber local. Merkwürdigerweise fing ich auch an der Küste bei Labuan einige Exemplare in einem schattigen Baumgarten bei meinem Hause.

Coelites.

Diese zarten Thiere haben einen ziemlich schwachen Flug, und gehen deshalb selten auf freie, sonnige Stellen hinaus, sondern halten sich in dunkelschattigen Waldern verborgen, wo sie nahe dem Boden sich herumtummeln und sich am liebsten an die Rinde der Baume setzen. Die Schmetterlinge sind alle nicht besonders häufig.

- 1). Nothis Doubleday.
- 2). Epiminthia Westwood. Die häufigste von allen.
- 3). Euptychoides Felder.

Da von diesem Genus im Ganzen nur vier Arten bekannt sind, so sieht man, wie reich Sumatra mit Arten dieser specifisch malaiischen Schmetterlingsgattung bedacht ist.

Hipio.

1). Lowii Doubleday. Auch dieses, durchaus nicht häufige, Thier muss man in Wäldern und Gebüschen aufsuchen, doch scheut es den Sonnenschein viel weniger als die Vorigen. Ich habe die meisten Exemplare in lichten, buschigen Wäldern gefangen an Baumstämmen, wo sie sich zusammen mit Legionen von Käfern und Dipteren, der schönen Prothoe Frankii, sowie den prächtigen, grossen Morphinen und Kallima-Arten an dem ausfliessenden Saft labten, ein Anblick, der jedes Sammlerherz höher schlagen macht.

Das Thier hat einen schnellen, raschen, unbestimmten Flug, und gleicht darin sowie in dem Zuschnitt und der Farbung der Flügel sehr dem an denselben Orten sich aufhaltenden Papilio helenus. Ich habe im Fliegen beide öfters verwechselt, trotz meines geübten Blickes, und halte dies desshalb für einen guten Fall von Mimicrie; sogar die Schwänze des Papilio helenus sind bei unsern Thiere vorhanden. Der Papilio, welcher sehr häufig ist und von den Vögeln nicht angegriffen wird, bildet das nachgeahmte, lowii das nachahmende Thier.

Erites.

Auch von dieser ausschliesslich malaiischen Gattung, welche nur vier Arten umfasst, kommen zwei auf Deli vor. Es sind zarte, wenig auffallend gefarbte Thiere, welche nur an wenigen, sehr dunkelschattigen Orten, in Urwäldern oder Bambushainen, aber dort nicht sehr selten, vorkommen. Sie fliegen immer nur wenige Fuss, von Busch zu Busch, und dies meist nur, wenn sie aufgescheucht sind.

- 1). Elegans Butler. In einem Bambushain bei Tandjong-Morawa, in Serdang, zusammen mit M. suyudana. Nur wenige Exemplare.
- 2). Argentina Butler. Dieses Thierchen habe ich auf meinen Tobahreisen, beidemale an derselben Stelle, nämlich in der Tiefe eines dunklen Urwaldes beim Kampong Nama Djambu, in etwa 1000 F. Meereshöhe, in mehreren Exemplaren jedesmal gefangen. Sie flogen zusammen mit Amnosia decora zwischen den Blättern der niederen Büsche.

Ragadia.

1). Crisia Hübner. In allen buschigen Wäldern, auch in schattigen Baumgärten, häufig, geht aber an den Gebirgsflanken höchstens bis 1500 Fuss empor. Das Thierchen fliegt langsam und etwas unbeholfen aber unstät dicht über dem Boden zwischen den Büschen und Kräutern und setzt sich selten, immer nur auf die Erde oder das abgefallene Laub.

Yphthima.

Auf allen Wegen und Stegen bebauter Ländereien zwischen der niederen Flora sich herumtreibend, die *Lantana*-Busche besuchend.

- 1). Methora Fabricius. Ueberall gemein.
- 2). Hübneri Kirby. Ebenso.

Diese beiden Arten kommen auf der Hochebene nicht vor und werden dort ersetzt durch

- 3). Pandocus Moore. Die Augenflecken dieser Art sind kleiner als bei javanischen Exemplaren.
- 4). Ich habe ferner noch, allein ich weiss nicht mehr genau ob von der Küsten- oder Hochebene, eine Species erhalten, welche ich nur als den 7 zu Distant's Y. newboldi (Rh. m., p. 57, T. IV, F. 6, Q) ansehen kann. Die Flügel oben sind gleichförmig bräunlich, die Vorderflügel mit einem grossen, fast zirkelrunden, doppelt gekernten schwarzen Fleck, der gelb umrandet ist, und sich, etwas näher an der Mittelzelle als am Aussen-

rande, vom ersten Discoidalnerven bis in die Hälfte von Zelle 3 erstreckt. Die Hinterflugel haben vor dem Aussenrande zwei schwarze, gelb umrandete und einfach gekernte Augen zwischen den Mediannerven. Die Unterseite ist weisslichgrau, durchgehends fein bräunlich gestrichelt. Die Augen wie auf der Oberseite, nur ist das Auge der Vorderflugel etwas breiter und schärfer gelb gerandet und etwas stärker gekernt. Auf den Unterflügeln kommt noch ein ziemlich grosses - bedeutend grösser als die 2 Augen zwischen den Mediannerven - schwarzes, gelb gerandetes md einfach gekerntes Auge hinzu, welches sich vom 2. Subcostalnerven bis über den Discoidalnerven hinaus erstreckt, und an welchem oben wischen erstem und zweitem Subcostalnerven ein blindes, kleines Auge hangt. Im Analwinkel befinden sich ferner noch zwei kleine, gekernte, zusammenhängende Augen zwischen dem 3. Median- und dem Submediannerven. Der Costalrand der Hinterslugel ist beinahe 2 Mm. länger als der Vorderrand. Der Unterschied zwischen meinem of und Distant's Q Exemplar besteht also nur in der geringern Grösse, — mein Exemplar misst 16 Mm. Flugellange - in dem Fehlen der bleichen Binde auf der Oberseite und dem Nichtsichtbarsein des Auges zwischen 2. Subcostalund Discoidalnerven der Hinterflügel auf der Oberseite.

Mycalesis.

Diese artenreiche Gattung stellt mit das grösste Contingent zu der Schmetterlingsfauna der bewohnten Strecken, wo sie, sich immer nahe am Boden haltend und gern auf demselben niedersitzend, des Wanderers Fuss auf Schritt und Tritt umgaukeln.

Die gemeinsten Arten sind:

1). Mineus Butler, justina Cramer. Diese Art variirt sehr bezuglich der Augen auf der Unterseite. Ich habe of von Deli, bei welchen das 2. und 3. Auge der Hinterstugel völlig sehlt!) und ein Q bei dem nur das dritte sehlt; die weisslich graue Einfassung ist auch dort geschlossen, sodass Auge 1 und 2 in einer eigenen, geschlossenen Einfassung stehen. Dann habe ich of Exemplare, bei welchen auf der Unterseite der Vorderstugel, dicht oberhalb des untern noch ein kleines, deutlich gekerntes Auge steht, und aus Tandjong-Morawa, Serdang, of und Q Exemplare, welche zwischen den beiden Augen auf der Unterseite der Vorderstugel

sogar zwei Augen besitzen, fast von derselben Grösse wie das obere.

¹⁾ Wie bei Distant's, l. c. T. IV, F. 7. Doch ist bei meinen Exemplaren die Einfassung nicht ganz unterbrochen, sondern nur stark eingeschnürt.

- 2). Drusia Cramer, ist vielleicht nur eine Varietät des Vorigen, mit dem sie zusammen vorkommt.
 - 3). Medus Fabricius, hesione Hubner.
 - 4). Anapita Moore.
- 5). Janardana Moore. Bei meinen of und einigemale auch bei Q fehlen die verloschenen Augen auf der Oberseite der Unterflugel beiderseits des
- 2. Mediannerven. Bei meinen javan. Exemplaren sind sie stets vorhanden. Seltener und mehr beschränkt sind:
- 6). Fuscum Felder. Ich habe diese Art nur auf düstern, seuchten Farrenkrautwildnissen im Wald gesangen.
 - 7). Orseis Hewitson. In Serdang gefunden.
- 8). Oroatis Hewitson. Bei Labuan, nur in einem einzigen Exemplar gefunden.
 - 9). Maianeas Hewitson. Selten.
 - 10). Blasius, var. lalassis Hewitson. In Serdang.

Von der Hochebene von Tobah habe ich erhalten:

- 11). Marginata Moore, welche dort sehr häufig ist und die Stelle der anapita der Kustenländer vertritt. Kein Thier greift in das Bereich des andern über, sie sind scharf local getrennt.
- 12). Muasicles Hewitson. Seltener, und auch an den Gebirgsflanken herabgehend.
- 13). Ustulata? Ein sehr schlecht conservirtes und desshalb unsicher zu bestimmendes Exemplar ward mir von einem meiner Batta-Sammler von der Hochebene von Tobah gebracht.

Elymnias.

Die Schmetterlinge dieser Gattung haben, ganz im Gegensatz zu den Danaiden (Danais und Euploea) welche man sehr maltratiren kann, ohne ihre Flügel und deren fest aussitzende Schuppen zu verletzen, ungemein zarte, leicht zerbrechliche und abstaubende Flügel, sodass man selten das Vergnügen hat, ein reines, unverletztes Exemplar aus dem Netze zu nehmen. Dies gilt besonders von den fünf ersten Arten. Die Schmetterlinge lieben schattige Garten. Buschige Rander von Bambupflanzungen und die halbverwilderten Obstgarten der Malaien sind ihr steter Ausenthalt. Sie sliegen langsam und träge, niemals auf weitere Entsernung,, und sitzen am liebsten auf der Schattenseite des Gebüsches an der Unterseite der Blätter.

Man sieht fast nur aufgescheuchte Thiere fliegen. An Bluthen saugend habe ich niemals eines gesehen.

Dadurch unterscheiden sich dieselben streng von den Danaiden, welche ihr ganzes Leben lang fast nur von Bluthe zu Bluthe gaukeln, selten sich niedersetzen, und sich weniger gern im Schatten zwischen Buschen, is im hellen Sonnenschein auf Wegen und lichten, freien Stellen herumreiben.

Meiner Meinung nach kann man desshalb hier nicht von einer eigentichen Mimicrie zwischen *Danais-*, *Euploea-* und *Elymnias-*Arten sprechen; hre Lebensweise, ihr Gebahren ist zu verschieden.

- 1). Leucocyma Godardt. Die gemeinste, durch das ganze Gebiet, mit Ausnahme der Hochebene verbreitete Art, welche ziemlich variirt. Die Quind seltener als die 3, vielleicht 1 auf 20.
- 2). Nigrescens Butler. Etwas weniger häufig und mehr local beschränkt, in Serdang und in den Vorbergen, am liebsten in Bambugebüsch fliegend.
 - 3). Lutescens Butler. Nicht häufig, z. B. in den Gärten oberhalb Labuan.
- 4). Species? Vielleicht das Q zu *E. borneensis*, vielleicht nova Species. Ich habe einige Exemplare, sammtlich Q, zusammen mit *E. lutescens* in rinem Baumgarten bei Labuan gefangen.
- 5). Penanga Westwood, var. Sumatrana Wallace. Selten. Ich habe nur Exemplare, ein 6ⁿ und ein Q, aus den Vorbergen erhalten.
- 6). Lais Horsfield und Moore. Häufig, aber, wie es scheint, local, z. B. in den Garten oberhalb Labuan. In Serdang bemerkte ich das Thier nicht. bie ist im Verein mit der folgenden, die lebhafteste Art ihres Genus, und setzt sich nicht gern niedriger als an 10—15 hohe Büsche oder Bäume.
- 7). Ceryx Boisduval. Kommt ausschliesslich auf der Hochebene von Tobah vor, ist aber dort in lichten, buschigen Wäldern nicht selten.

3. MORPHINAE.

Die in diese Gruppe gehörigen Schmetterlinge sind sammtlich schattenliebende Thiere, welche man meistens in dunkeln Waldern aufsuchen muss. Sie sliegen krastig und schnell, aber, mit wenigen Ausnahmen, nie weit oder anhaltend. Ausgescheucht, sind sie bestrebt, sosort wieder ein neues Versteck an Baumrinde oder zwischen dürren Blättern aufzusuchen, mit denen ihre zusammengesalteten Flügel so gut harmoniren, dass ein gutes Auge dazu gehört, die beträchtlich grossen Thiere zu erkennen, selbst wenn man sie hat einfallen sehen. Niemals breiten sie im Sitzen die Flügel aus — sie wissen offenbar, dass ihre einfarbige Unterseite sie schutzt.

Amathusia.

1). Phidippus Linné. Dieser Schmetterling halt sich beinahe ausschliess-

lich unter den Hausern zwischen dem Gebalk auf; bekanntlich ruhen die meist aus Brettern oder Atap (Palmblattern) erbauten Hauser auf Pfahlen Auch zwischen dem Gebalk der Dacher liebt er zu sitzen. Es ist ein sehr haufiger Schmetterling, der fast bei jedem alteren Hause zu finden ist Im Freien sieht man ihn selten, am ehesten noch in Kokosnussgarter zwischen den braunen, abgestorbenen Blattern. Im eigentlichen Urwalchabe ich ihn nie gesehen.

Thaumantis.

1). Klugius Zincken. Nicht häufig.

Zeuxidia.

1). Amethystus Butler. Meist nur im tiefen Wald, in dessen düsterem Schatten die prachtvolle Färbung des of beim Fliegen um so mehr auffällt. Diese Art und die vorige mit der Kallima paralecta und Prothoe Frankii, alle ihre wunderherrlich schimmernden, grossen Flügel an einem einzigen Baum auf einem saftschwitzenden Plätzchen zusammen ausbreiten zu sehen, wie mir mehrere Male begegnet ist, das ist ein Anblick, den ich jedem Entomologen einmal wünsche!

Discophora.

Mit Vorliebe in Bambugebuschen, zwischen deren todten Blättern und Aestchen sich die Thiere beinahe unauffindbar zu verstecken wissen. Ihr Flug ist sehr rasch, kräftig, stossweise in kurzen Bögen von einem Versteck nach dem andern. Sie sind sehr scheu.

- 1). Tullia Cramer. Nicht sehr häufig.
- 2). Species? Bei der vorigen stehend, noch nicht naher bestimmt. Nicht selten.
 - 3). Sondaica Boisduval. In Serdang.
- 4). Necho, var. cheops Felder. Die häufigste Art von allen, von derselben Varietät, wie sie auf Borneo vorkommt. In jedem Bambugebüsch zu finden.

Enispe.

1). Eutymius Doubleday. Von meinen Sammlern aus den Battabergen in mehreren Stücken angebracht, fast immer zusammen mit Limenitis dudu.

Amnosia.

1). Decera Doubleday. Ich habe diese schöne Art nur an einem einzigen Ort, in einem dichten Wald bei Nama Djambu in den Vorbergen, aber

dort nicht selten gefunden. Sie flog zusammen mit Erites (s. dort) und immer nur eine kurze Strecke, von einem Busch zum andern, in dessen Geblätter sie sich mit zusammengefalteten Flügeln verbarg. Das von Forbes (Wanderungen eines Naturforschers im malaiischen Archipel, übersetzt v. Teuscher. Bd. I, Pag. 184) als characteristisch angegebene Gebahren habe ich nicht bei dieser Art, wohl aber bei Prothoe Frankii beobachtet.

Clerome.

Ansschliessliche Schattenthiere, welche sich nur im Dunkel der Urwälder wohl fühlen, und dort den ganzen Tag langsam, ober unstät und
anhaltend dicht über dem Boden dahinfliegen. Die Xanthotaenia busiris
leistet ihnen dabei Gesellschaft.

- 1). Arcesilaus Fabricius. Ein gemeines Thier, aber nur in den Bergwaldern der Gebirgsflanken, und im Karo-Gebiet auch bis auf die Hochebene hinaufgehend. An manchen Orten fliegt das Thier so häufig, dass die Walder förmlich von ihnen wimmeln.
 - 2). Gracilis Butler. Viel seltener.

Xanthotaenia.

1). Busiris Westwood. Nicht so gemein als arcesilaus, an denselben Orten, und ebenfalls unstat dicht am Boden dahinfliegend, ohne viel niederzusitzen. Besonders häufig war das Thier in den Bergwaldern von Oberserdang.

4. ACRAEINAE.

Acraea.

Diese Familie ist in Deli nur durch eine Gattung und eine einzige Art vertreten, namlich:

t). Vesta Fabricius. Dieselbe kommt nur auf dem Plateau von Tobah im Karo-Gebiet vor, also im nördlichsten Theil; auf der ganzen Strecke des Plateaus von der Grenze Deli-Serdang's bis zum Tobahsee habe ich kein einziges Exemplar gesehen.

In den Karolandern muss das Thier gemein sein, denn meine Sammler brachten mir von dort grosse Mengen. Der Schmetterling soll nach ihrer Aussage träge zwischen den hohen Grashalmen der Lalangsavanen herumfliegen.

5. NYMPHALINAE.

Cethosia.

Auch diese prachtigen Schmetterlinge lieben vorzugsweise den Wale und den Schatten. Lichte buschige Walder, besonders in den Vorbergen bilden ihren Lieblingstummelplatz, auf dem sie sich in mässig langsamer Flug den ganzen Tag herumtreiben, ohne kaum jemals niederzusitzen ich habe dies wenigstens nie beobachtet.

- 1). Logani Distant, Ent. month. mag., 1881, Vol. XVIII, p. 134. Ich habe zwei Exemplare erhalten, weiss aber nicht mehr gewiss, ob sie au der Kustenniederung oder von der Hochebene stammen.
 - 2). Biblis Drury. Auf der Hochebene von Tobah. Nicht häufig.
- 3). Methypsea Butler. Nicht selten in den Waldern der Küstenebene, we sie die C. biblis der Hochebene zu ersetzen scheint.

Ein Q hat die röthlichgelben Felder beider Flugel ziemlich reichlich, unregelmässig schwarz getupst, mehr noch als C. logani, und die Flecken binde vor der Spitze wie beim of reinweiss.

Die Flugellange meiner 7 variirt sehr; sie misst beim grössten 44 Mm., beim kleinsten 34 Mm. Die des Q hat 40 Mm.

4). Cyane Drury, hypsina Felder. In der Küstenebene und den Vorbergen nicht selten.

Terinos.

Ich selbst habe kein Exemplar dieser Gattung gefangen, doch führt Herr Dr. Staudinger in seiner Preisliste, N° XXXIII, die Art

- 1). Teuthras, var. Delianus auf. Stammt vielleicht seine
- 2). Robertsia, var.?sumatrana ebenfalls von Deli?

Cirrochroa.

Lebhafte, schnellsliegende Thiere, die den Sonnenschein lieben. Ein Lieblingsausenthalt ist sonnenbeschiener Jungwald. Auch die Bluthen der Lantana-Sträucher ziehen sie an.

- 1). Orissa Felder. Nicht selten; an sonnigen Buschen der Wegrander.
- 2). Satellita Butler. Weniger häufig; an denselben Orten.
- 3). Bajadeta Moore. Ebenfalls nicht häufig, in Serdang und weiter an der Ostkuste hinunter.
- 4). Malaya Felder. Häufig. An heissen Tagen kann man den Schmetterling oft zu Dutzenden an den Pfützen der Wege sitzend finden.
 - 5). Aoris Doubleday. Selten.

Messaras.

1). Erymanthis Drury. Ein sehr häufiges, vorzugsweise in bewohnten und behauten Strichen vorkommendes Thier, das in nicht besonders schnelem Fluge und häufig niedersitzend die Blumen der Gärten und Brachfelder besucht, besonders die Lantana-Sträucher, und seinen Lieblingsstandort auf den sonnenbeschienen Blättern der Büsche längs der Wege und Strassen hat, wo es oft lange mit zusammengefalteten Flügeln stille sizt. Der Schmetterling beschränkt sich ziemlich eng auf seine Geburtsstelle und unternimmt keine grossen Streifereien; ein einziger Busch und einige blühende Sträucher genügen ihm für sein ganzes Leben; man kann sicher sein, ihn jeden Tag dort am bestimmten Orte sitzen oder fliegen zu sehen.

Cynthia.

1). Arsinoë Cramer. Ein nicht gerade häufiges Thier, das gewöhnlich in reissend-schnellem Flug dahin segelt, und nur selten, in den Morgenstunden, Bluthen, von Lantana z. B. besucht. In den heissen Mittagsstunden dagegen sitzen sie ziemlich fest und regelmässig an feuchten Pfützen der Wege und Gräben und lassen sich dann mit Bequemlichkeit fangen. Das Q ist ausserordentlich viel seltener als der o; ich habe während meines langjährigen Aufenthaltes nur ein einziges gesehen.

Atella.

In Sonnenschein auf Blumen fliegend, wie etwa unsere Argynnis-

- 1). Phalanta Horsfield und Moore. Nicht selten, an Lantana-Sträuchern oft sogar häufig.
 - 2). Alcippe Cramer. Weniger haufig.
- 3). Egista Cramer. Nur auf der Hochebene von Tobah, aber dort nicht besonders selten.

Argynnis.

1). Niphe Linné. Auch dieser Schmetterling kommt ausschliesslich auf dem Plateau von Tobah, aber dort in den grossen ausgedehnten, baumlosen Lalangsavanen sehr haufig vor, wo er sich gerne nach Art unserer A. latonia an die Wegränder setzt. Er gehört zu den für das Plateau characteristischen Thieren. Das Q ist viel seltener als der on, vielleicht wie 1:20.

Symbrenthia.

Auf buschigen Waldwegen und Hainen; der Schmetterling sitzt mit

zusammengefalteten Flügeln auf den Blättern der Büsche, am liebstein Mannshöhe, und fliegt, aufgescheucht, schnell und stossweise nach dem nächsten Busch, um, wenn er nicht weiter gestört wird, nach senem vorigen Standort zurückzukehren. Blumen habe ich ihn nicht t suchen sehen.

- 1). Hyppoclus Cramer. Sehr häufig, in den höheren Strecken von De
- 2). Hypselis Godardt. Ich habe mehrere Exemplare an einem sonnig Waldrande bei Nagasaribu auf der Hochebene von Tobah gefangen.
- 3). Hypatia Wallace. Nur in einem einzigen Stück gefangen, von de ich nicht sagen kann, ob es von der Hochebene oder aus den Küste ländern stammt.

Pyrameis.

r). Cardui Linné. Dieses kosmopolitische Thier ist auf der Hochebe von Tobah überall gemein; die Exemplare sind kleiner als die europschen und die javanischen; sie messen nur 39—42 Mm. Flugweite. I sonders häufig fliegt der Schmetterling um eine ebenfalls auf die Hochebene beschränkte Artemisia-Art (s. im botanischen Theil). Ich vermuth dass dies auch die Nahrungspflanze für die Raupe ist.

Junonia.

In Gärten, Feldern und sonstigen lichten, sonnigen Orten, in ihre Gebahren vollkommen mit unsern Vanessa-Arten übereinstimmend, n ist ihr Flug weniger schnell und rasch. Durch ihre Häufigkeit helfen abesonders zur Bestimmung des zoologischen Characters der Ostküste m Ihr Verbreitungsbezirk geht bis auf die Hochebene.

- 1). Laomedia Linné. Gemein.
- 2). Asterie Linné. Gemein.
- 3). Orithya Linné. Fast ausschliesslich auf die Lalangsavanen beschranl aber dort oft in erdrückender Anzahl. Auf einer einzigen solchen vor Wald umschlossenen, grösseren Graswuste in Ober-Serdang sah ich de Thier einmal in solcher Menge, dass man buchstablich mit jedem Schrein halbes Dutzend von ihren Ruheplatzen auf dem Boden oder an de Grasstengeln aufstörte. Im Sitzen werden die Flugel bei beiden Geschlectern, welche etwa gleich häufig sind, gewöhnlich ausgebreitet.

Precis.

Lebensweise wie die vorige Gattung.

1). Ida Cramer. Gemein.

2). Iphita Cramer. Von der Varietat, welche Distant in seinen Rhop. mel. T. IX, F. 5 abbildet. Etwas weniger gemein.

Rhinopalpa.

1). Polynice Cramer. Gebahren wie bei den vorigen, aber mehr im Schaten der Baume und Häuser; auf Blumen kann ich mich nicht erinnern se gesehen zu haben. Nicht gerade häufig; man trifft ab und zu ein verinzeltes Exemplar.

Kallima.

1). Paralecta Horsfield. Der durch Wallace so bekannt gewordene "Blattchmetterling" ist in den Wäldern Deli's keineswegs sehr selten. Sein Gebahren ist durch Wallace schon genügend beschrieben; ich will hier er eine Bemerkung anfügen, welche für die Beurtheilung der "Mimicrie" in nicht ohne Werth scheint. Verschiedene Exemplare namlich, die von ir eine Zeit lang verfolgt wurden, versteckten sich nicht zwischen dur-Aesten und Blättern, wo ihre Farbe sie meinen Späherblicken sehr at hatte entziehen können, sondern sie setzten sich frank und frei, mit sugebreiteten Flugeln, sodass das leuchtende Veilchenblau und Orange der Innenseite sie auf weithin kenntlich machte, auf die Oberseite eines runen Blattes! Dies scheint mir am deutlichsten das Unbewusste in der achahmung zu beweisen; der Schmetterling weiss nicht, dass ihn die chnlichkeit seiner Unterseite mit einem Blatte schutzt; die Exemplare, ten Gewohnheiten sie mit Vorliebe zwischen durre Blätter fliegen liesa, sind mehr erhalten worden, als die andern, und so ist durch Verarbung allmählich die ganze Rasse an diese Gewohnheit gekommen; soch wird es wohl bei jeder Generation Rückschläge auf frühere Gepflosenheiten geben, die denn natürlich auch eher untergehen werden, als e andern; ich habe wenigstens alle diese Exemplare in mein Netz becommen. Dies scheint mir die natürlichste Erklärung dieser Erscheinung.

Doleschallia.

Nicht selten, in der Umgebung baumbeschatteter Häuser und Garten, sich die Schmetterlinge gern an das Holzwerk der Veranden und Zaune, mit zusammengefalteten Flügeln setzen.

- 1). Bisaltide Cramer. In Serdang.
- 2). Pratipa Felder. In meinem Garten zu Labuan habe ich die Raupe ich Schmetterlings zu Dutzenden auf den Buschen des als Zierstrauch wich von Malaien viel gepflanzten Graptophyllum hortense gefunden und

aufgezogen. Dieselben waren sammtschwarz wie etwa die Raupe unser Tagpfauenauges mit astigen Stacheln, und mehreren Reihen stahlblaue Warzen über den Rücken und an den Seiten. Der Puppenzustand dauer nicht ganz 14 Tage.

Eurytela.

1). Horsfieldis Boisduval. Nicht selten, auf sonnigen Waldlichtunger wo der Schmetterling gern mit platt ausgebreiteten Flügeln auf den Blättern der Büsche sitzt.

Auch die von Distant l. c. abgebildete Varietat habe ich gefunden.

2). Castelnaui Felder. Ziemlich selten, an ebengenannten Localitates

Ergolis.

Licht- und sonnenliebende Thiere, in ihrem Leben und Gebahren gaz mit der Gattung *Precis* übereinstimmend.

- 1). Ariadne Linné. Ueberall gemein.
- 2). Taprobana Westwood. Mehr local beschränkt, aber an solchen Orte häufig, und die vorige Art oder Varietät fast ganz verdrängend.

Cyrestis.

Diese sind hochst merkwurdige Thiere, sowohl in Form und Farbe als in Bewegung und Betragen. Am meisten, ja fast ausschliesslich, triff man sie auf der Erde an den feuchten Pfutzen der Wege, wo sie mi platt und flach ausgespreitzten Flügeln dasitzen, und aufs tauschendst einem abgerissenen Fetzen beschriebenen, weissen Papiers gleichen. We jedoch dies für eine Art von Nachahmung (Mimicrie) halten möchte dem gebe ich zu bedenken, dass weder Batta's noch Malaien jemals i der Lage sein dürften, öfters beschriebene Papierfetzen wegzuwerfen, um Europaer halten sich erst seit 25 Jahren dort auf. Ich will hiemit nu zeigen, wie ausserordentlich vorsichtig man in der Erklärung solcher Aehn lichkeiten sein muss.

Auch ihr Flug, sehr schnell und stossweise, findet ohne bemerkbare Heben und Senken der Flügel statt; eine fliegende Cyrestis nivea z. B sieht wirklich ganz wie ein Stückchen Papier aus, das von einem Wind zug erfasst, plötzlich vom Boden in die Höhe gerissen, eine Zeitlang is der Luft umhergewirbelt und nach kurzer Zeit wieder eben so plötzlich und unvermittelt zu Boden fallen gelassen wird. Sie fliegen niemals weit und kehren, wenn auch verfolgt, hartnäckig nach einiger Zeit zu ihrer geliebten Pfütze zurück.

- 1). Nivea Zincken. Nicht selten.
- s). Species? Eine noch nicht näher bestimmte Art, welche ich von der Hochebene von Tobah erhalten habe. Herr Rogenhofer in Wien bilt dieselbe für *C. irmae* Forbes. Herr Forbes hat dieselbe in Palembang gefangen.
- 3). Rahria Westwood. Diese Art ist nie auf dem Erdboden, sondern zur auf den Blattern von Büschen und Sträuchern zu finden, auch oft an den Blumendolden einer Sambucus-Art. Sehr häufig, aber auf gewisse One beschränkt. Gemein z. B. bei Labuan.

Stibochiona.

1). Coresia Hübner. Ich habe dieses schöne Thierchen nur in lichten Wildern auf der Hochebene von Tobah gefangen, wo es im Sonnenthein auf den Büschen flog, zusammen mit Elymnias ceryx.

Hypolimnas.

Die Schmetterlinge dieser Gattung gleichen in ihrem Betragen ganz

- 1). Misippus Linné. Sehr häufig, auf Blumen, und auch mit Vorliebe auf dem kurzen Grase der Wegränder. Das Q ist eine Kleinigkeit seltener als der 3.
- 2). Bolina Linné. Etwas seltener. Wahlt meist Busche und Sträucher zu meinem Ruheplatz. Das Q variirt ausserordentlich; so ist z. B. die Varietat
- 3). Jacintha Drury, bei Labuan sehr gemein.
- 4). Anomala Wallace. Nicht gerade häufig, vorzugsweise an den Randern von Bambugebusch. Ich weiss wirklich nicht, ob man die Färbung dieThe Art als einen reinen Fall von Mimicrie betrachten darf, denn unser The fliegt nicht an denselben Oertlichkeiten durch einander mit Euploea vilanus, dessen Farbe das Q nachahmen soll.

Hestina.

1). Nama Boisduval. Das Rothbraun der Hinterstügel der nordindischen Exemplare ist bei meinen auf der Hochebene von Tobah — nur dort kommt der Schmetterling in unserm Gebiet vor — in reines Schwarz bergegangen, sodass also in Sumatra der Schmetterling eher Danais spientrionis nachahmt, als D. titya, welch letzterer ja, wie wir gesehen keben, eine sehr ahnliche Varietat ebenfalls auf der Hochebene vorkommt (D. tityoides). Nicht selten.

Euripus.

Auf sonnigen Waldwegen am Unterholz. Die Thiere gleichen in Flu und Betragen, sowie in der Farbe ganz gewissen Neptis-Arten, mit de nen sie auch durcheinander fliegen, sodass man hier wohl an Mimicrie denken könnte. Das, übrigens sehr seltene (wohl 1:60—80), Q soll be kanntlich das Q von Euploea rhadamanthus nachahmen. Dagegen mus ich wiederum constatiren dass die beiden Thiere erstens ganz getrennte Localitäten bewohnen (Euripus halitherses den Wald, Euploea rhadamanthus das freie Feld) und zweitens, dass auch das Q von E. rhadamanthus ein ebenfalls seltenes Thier ist.

- 1). Halitherses Doubleday.
- 2). Euploeoides Felder.

Parthenos.

1). Gambrisius Fabricius. Ueberall, wo die Sonne auf Gebüsch scheint häufig, in manchen Jahren sogar gemein. Ich habe einmal auf einen neu angelegten, mit Gebüsch eingefassten Feldweg, hunderte diese Schmetterlinge sich von Busch zu Busch tummeln sehen; jeder für sich allein, ohne sich um den andern zu kümmern. Ihr Flug ist sehr kräftig und schnell, schwebend, fast ohne Flügelschlag. Doch sitzen sie oft um gerne nieder auf der Oberseite der Blätter, mit stets ausgebreiteten Flügeln

Lebadea.

1). Martha Fabricius. Nicht selten in lichtem, sonnigem Jungwald wo von Zeit zu Zeit Holz geschlagen wird.

Limenitis.

- 1). Procris Cramer. Ziemlich häufig, auf lichten, von der Sonne be schienenen Waldwegen, wo das Thier gerne, und immer mit flach ausge breiteten Flugeln, auf den Blättern einzeln über den Weg hängende niedriger Zweige sitzt. Sein Flug hat grosse Aehnlichkeit mit Parthens gambrisius.
- 2). Dudu Westwood. Ich habe nur 2 Exemplare von meinen Sammlen von den Karolandern von der Hochebene (möglicherweise auch aus den höheren Theil der Vorberge) erhalten.

Pandita.

1). Sinope Moore. Ich habe auf der Hochebene einige Exemplare gegefangen, welche in der Sonne auf Gebusch oder dem nackten Erdbo

ten mit gefalteten Flügeln sassen. Ihr Flug ist weder besonders noch raftig.

Neptis.

- 1). Aceris Lepechin. Der gemeinste Schmetterling auf der ganzen Ostinste bis auf die Hochebene hinauf.
- 2). Nata Moore. Selten, mehr in waldigen Gegenden.
- 3). Ophiana Moore, var.? Ziemlich selten, ebendort.
- 4). Vikasa Moore. Nicht besonders selten, über das ganze Gebiet
- 5). Species? Noch nicht näher bestimmt. Exemplar in der Sammlung h Leiden.
- 6). Hordonia Stoll. In gewissen Gegenden, z. B. bei Labuan, nicht elten, wo das Thierchen mit Cyrestis rahria durcheinander fliegt und on demselben kaum zu unterscheiden ist trotz der verschiedenen zeichnung dennoch eine Art Mimicrie.
 - 7). Peraka Butler. In den Vorbergen, nicht häufig.
 - 8). Heliodora Cramer. Selten, in Serdang.

Athyma.

Lebensweise wie die Vorigen.

- 1). Perius Aurivillius. Ueber das ganze Gebiet verbreitet und nirgends besonders selten. Besonders gern in schattigen Obstgarten.
- 2). Reta Moore, var.? Selten, besonders auf Waldwegen, die mit Busch eingefasst sind.
- 3). Nefte Cramer. Nicht besonders selten, an denselben Orten wie

Euthalia.

Eine schattenliebende Gattung, welche ebenfalls Walder, in denen wiel Busch vorhanden ist, bevorzugt; doch kommen auch Arten ausschliesslich in Obstgarten und alten, verlassenen Feldern vor. Ihr Flug ist durchweg rasch, bei einigen Arten reissend, doch kehren sie meist nach kurzer Zeit wieder auf ihren früheren Ort zurück. Sie sitzen mit ausgebreiteten Flügeln, auf Blättern, oder, oft zu Dutzenden, an herabgefallenen, faulenden Früchten, besonders der Feigenbäume. Sie sind sehr scheu und oft schwer zu fangen.

t). Blumei Snellen van Vollenhoven. Fast ausschliesslich im dunkeln Hochwald auf Farrenkräutern und Büschen, auch an den oben erwähnten Feigenfrüchten. Nicht selten, in manchen Wäldern sogar häufig.

- 2). Derma Kollar. Ziemlich selten. Ich habe den Schmetterling öfter im Schatten der Häuser an Abzugsgräben gefangen.
- 3). Dunya Doubleday. Selten und nur im schattigen Hochwald, au Buschen.
 - 4). Parta Moore und
- 5). Kanda Moore. Zwei Borneo eigenthumliche Arten, die meines Wissens sonst noch nirgends gefunden sind.
- 6). Ladekingii Snellen van Vollenhoven. Ziemlich häufig, besonder gern auch an den Abfallstätten der Häuser.
 - 7). Cocytina Horsfield. Nicht häufig.
- 8). Anosia Moore. Von dieser Art habe ich nur ein oder zwei Exemplar gefangen, in den Waldern von Serdang.
- 9). Laverna Butler. Etwas weniger häufig, an gefallenem Obst und Ab fallstätten.
 - 10). Ramada Moore. Ziemlich selten, an denselben Orten.
 - 11). Salia Moore. In Serdang.
- 12). Garuda Moore. Die häufigste Art, in allen Obstgarten und Ab fallstätten zu finden. Das Thier ist sehr scheu und hat einen raschen reissenden Flug, kehrt aber immer bald wieder nach seinem alten Stand ort, gewöhnlich einem Haufen faulender, weggeworfener Früchte, zurück. Sie lassen sich, wie die meisten Schmetterlinge dieser Gattung überhaupt mit zerkautem Zuckerrohr gern ködern.
 - 13). Jama Felder. Einige Exemplare, sammtlich QQ.
- 14). Lubentina Horsfield und Moore. Selten, aber über das ganze Gebiet, in Obstgärten.
- 15), Adonia Horsfield und Moore. In meinem Obstgarten bei Labuan habe ich zwei Exemplare gefangen. Dieselben, ein of und ein Q, waren bedeutend weniger lebhaft gefarbt, als Exemplare, welche ich in Java fing.

Tanaecia.

Lebensweise wie die Vorigen. Flug minder schnell.

1). Pulasara Moore, var.? Nicht selten, in lichten Wäldern.

Symphaedra.

1). Dirtea Fabricius. Dieser schone Schmetterling ist sehr haufig, aber nur an dichtbeschatteten Stellen, zum Beispiel an halb ausgetrockneten, von Bambu überschatteten Strassengraben, unter den Hausern der malaiischen Kampongs und in deren Umgebung, sowie in Waldern. Das Thier hat einen sehr raschen, schnellen Flug und ist sehr scheu, doch fliegt es, selbst verfolgt, immer nur eine ganz kurze Strecke, und setzt sich mit ausgebreiteten Flügeln stets auf den Boden, niemals an Zweige oder Aeste.

Apatura.

1). Parisatis Westwood. Dieser jammerliche, unscheinbare Vertreter unserer schönen Schillerfaltergruppe findet sich ausschliesslich auf lichten, mit Busch umwachsenen Waldwegen, wo man ihn häufig an den Excrementen von Paradoxurus musanga, oder an Grasstengeln sitzen sehen kann.

Dichorrhagia.

r). Nesimachus Boisduval. In lichtem Gebüsch und auf Waldstrassen. Der Schmetterling erhebt sich bei Annaherung mit pfeilschnellem Flug, mm sich jedoch schon nach kurzer Strecke plötzlich und unvermittelt auf einen Busch oder den Erdboden niederzulassen, wo er die Flugel ganz platt ausbreitet, etwa wie die nach englischer Manier aufgespannten Schmetterlinge. Niemals legt er die Flugel zusammen.

Früher ziemlich haufig, jetzt aber fast selten geworden, da dieses Thier, wie so manches andere, durch das totale Ausrotten der Walder in Deli allmalig ausstirbt. An Orten, wo ich vor 8 Jahren viele Exemplare gesehen und gefangen habe, ist jetzt kein Stück mehr zu bewerken.

Charaxes.

Nicht gar zu sonnige, mit Gebusch eingefasste Waldwege bilden den Tummelplatz dieser Gattung. Feuchte Pfützen während der heissen Tagesstunden, sowie thierische und menschliche Excremente, auch faulende Früchte, gekautes Zuckerrohr, haben ebenfalls grosse Anziehungskraft. Ihres scheuen, unbändigen Wesens sowie ihres ausserordentlich kräftigen, pfeilschnellen Fluges halber sind sie schwer zu fangen. Einmal im Netz, fahren sie so wüthend umher, dass sie sich im Handumdrehen ihre brüchigen Flugel zerstossen. Nur selten wird man die Freude haben, ein Thier, welches man in voller Pracht hat dasitzen sehen, unbeschädigt aus dem Netz nehmen zu können.

- 1). Delphis Doubleday. Selten.
- 2). Harpax Felder. Ziemlich verbreitet.
- 3). Athamas Drury. Nicht selten. Ebenso die Varietaten:
- 4). Samatha Moore und
- 5). Moori Distant, l. c., p. 108.

Ferner fing ich in 2 Exemplaren eine Art, welche nahe bei den let tern steht, und vielleicht eine neue Species, wahrscheinlich aber ni eine Varietät von Athamas ist.

Prothoe.

1). Frankii Godardt. Ein nicht gar zu seltener Schmetterling, der ge wöhnlich nur im Waldesdunkel anzutreffen ist, wo man ihn des Morger und Abends sich mit ausgebreiteten oder wippenden Flugeln an au fliessendem Baumsafte laben sehen kann, zusammen mit Morphinen Kallima und Hipio. Oft habe ich ihn auch ruhig mit dicht zusammenge falteten Flugeln, sodass die Oberflugel fast ganz verdeckt waren, a der Rinde von Bäumen in Mannshöhe sitzen sehen, und zwar stets m. den Kopfe nach unten. Man wird dies aber kaum gewahr, da die stum; fen Ecken der Hinterflügel aufs täuschendste selbst dem nahe beobaci tenden Auge, einen Kopf vorspiegeln. Die ganze Haltung des Thieres is auch dieser Tauschung angepasst. Sie nutzt dem Thiere insofern, al der Nachstellende - ob Thiere oder Mensch - nicht vermuthen kanr dass die erste Fluchtbewegung des Schmetterlings naturlich nach unte gerichtet sein muss. Ich habe durch diesen Kniff mir die ersten Exemplar auskommen sehen müssen. Uebrigens fliegt der Schmetterling, selbst ge jagt, nicht sehr weit, sondern lasst sich bald wieder an einem ander Baum in der characteristischen Weise nieder.

II. LEMONIIDAE.

I. LIBYTHAEINAE.

Libythea.

1). Myrrha Godardt. Ein nicht gerade häufiger Schmetterling, an der Wänden sonniger Hohlwege auf der Hochebene, wo er am häufigster ist, und auf den nackten, sonnigen Sandbänken der Flussufer in de Kustenebene.

2. NEMEOBIINAE.

Alle die hieher gehörigen Schmetterlinge finden sich ausschliesslich im dichtesten Urwald, wo sie ziemlich träge, meist mit offenen Flugelr auf den Blättern niederer Büsche sitzen, während die Angehörigen der Gattung Taxila nur die entlegensten, dunkelsten Stellen bevorzugen lieben die Gattungen Zemeros und Abisara mehr die lichteren, sonnigern Partien.

Zemeros.

1). Flegyas Cramer. Nicht häufig.

Abisara.

- 1). Savitri Felder. Selten.
- 2). Echerius, var. Kausambi Felder. Etwas häufiger.

Taxila.

- 1). Thuisto Hewitson. Selten.
- 2). Haquinus Fabricius. Ebenfalls selten, sowie
- 3). Telesia Hewitson.

Stiboges.

r). Nymphidia Butler. Nur auf der Hochebene von Tobah, wo ich das Thierchen bei Nagasaribu auf den Gebüschen längs einem breiten Waldweg in verschiedenen Exemplaren fing. Sie sassen stets mit platt ausgebreiteten Flügeln.

III. LYCAENIDAE.

Miletus.

- 1). Symethus Cramer. In schattigen Gärten gemein. Das Thier fliegt nur im Schatten und sitzt am liebsten an der Unterseite der Blätter niedriger, dichtbelaubter Bäume, wie z. B. mit Vorliebe an Pompelmusen (Citrus), auch im Bambudickicht.
 - 2). Horsfieldi Moore. Fliegt ganz wie der vorige.

Allotinus.

1). Major Felder.

Cupido.

- 1). Rosimon Fabricius. Auf lichten Waldwegen oft in grosser Menge in dem Grase sitzend.
 - 2) Ethion Doubleday. Wie der vorige.
 - 3). Roxus Godardt.
 - 4). Suidas Felder.
 - 5). Céleno Cramer.
- 6). Boeticus Linné. Das Thier habe ich nur auf der Hochebene von Tobah in circa 4000 F. Höhe, aber dort in Menge gefangen. Ausserdem bemerkte ich stets einige Exemplare bei meiner Wohnung in der Nahe

von Labuan, an der Meereskuste, auf einigen Indigostrauchern fliegent und dieselben nie verlassend. Sollten dies vielleicht von Singapore ode Penang mit den Indigopflanzen herübertransportirte Exemplare gewese sein? Zu bemerken ist, dass diese Indigostraucher schon seit mehr al 15 Jahren dort verwildert waren.

- 7). Nov. sp.? Eine noch nicht bestimmte, wahrscheinlich neue Art.
- 8). Nov. sp.? Wahrscheinlich ebenfalls neu.
- 9). Elphis Godardt. Gemein.
- 10). Aetherialis, var. Gemein.
- 11). Malaccanus Röber. Im Schatten eines lichten Waldes von Glute renghas sehr häufig.
 - 12). Hylax Fabricius. Hochebene von Tobah.
 - 13). Malaya Horsfield.
 - 14). Nora Felder.
 - 15). Sp.? Noch nicht näher bestimmt.
 - 16). Strabo Fabricus. Weniger häufig.
 - 17). Kandarpa Horsfield. Nicht häufig.
 - 18). Parrhasius Fabricius. Auf der Hochebene von Tobah häufig.
 - 19). Akasa Horsfield. Ebenfalls auf der Hochebene.
 - 20). Karsandra Moore.
 - 21). Lysisone Snellen.
 - 22). Sp.? Ebenso klein als pygmaea Snellen. Plateau von Tobah.
 - 23). Cagaja Felder.
- 24). Bochus Cramer. Ein nicht häufiges, locales Thier, sehr scheu um schnell fliegend, welches ich, am häufigsten an sonnenbeschienenen Gebuschrändern, gefangen habe, an deren Blätter es sich gerne setzt.

Hypochrysops.

1). Elegans Druce. Ein häufiges Thier, welches gern mit zusammen geschlagenen Flügeln auf sonnenbeschienenen Büschen sitzt. Hiebei reib es fast beständig in mahlender Bewegung die Unterflügel mit ihren Anhängseln an einander.

Aphnaeus.

1). Vulcanus Fabricius. Gemein, an denselben Orten. Auch dies Thier besitzt die Gewohnheit des vorigen, die Unterstügel an einander zu reiben

Ilerda.

1). Epicles Godardt. Ein, wie es scheint, sehr seltenes Thier, denn ich erhielt nur ein Exemplar aus den Battabergen angebracht.

Hypolycaena.

1). Erylus Godardt. Nicht häufig, in buschreichen Gegenden.

Poritia.

1). Erycinoides Felder. Die einzige, noch dazu seltene Art dieser schönen Gattung, welche ich in Delf fing.

Iolaus.

- 1). Vidura Horsfield. Häufig, besonders oberhalb Labuan, auf Gebusch and Bäumen in den Gärten der Eingebornen.
 - 2). Isaeus Hewitson.

Pseudodypsas.

1). Bengalensis Moore.

Sithon.

- 1). Jalindra Horsfield.
- 2). Freya Fabricius. Nicht selten, in lichtem, buschigem Wald.
- 3). Chitra Horsfield. Nicht selten.
- 4). Etolus Fabricius. Selten.
- 5). Nedymond Cramer. Nicht selten, aber im dichten Urwald, wo er sich stets an die Unterseite der Blatter niederer Busche setzt, ziemlich schen ist, aber, selbst aufgescheucht, nicht weit, gewöhnlich zum nachsten Busch, fliegt.
 - 6). Spec.? Noch nicht determinirt.
 - 7). Spec.? Ebenfalls noch nicht bestimmt.
 - 8). Amrita Felder. Selten, in lichten Waldern.
 - 9). Moorei? Distant. Häufig, bei Labuan an der Kuste.
 - 10). Ravindra Horsfield.
- 11). Hiemalis Godman und Salvin. Gefangen habe ich das Thier nicht, wohl aber glaube ich es einmal im Wald auf einem Blatt sitzen gesehen zu haben.

Myrina.

- 1). Pita Horsfield.
- 2). Cassiopeia Distant? Nur in einem Exemplar gefangen.
- 3). Atymnus Cramer. Die häufigste Art dieser Gattung, und in lichten Waldern an Büschen nicht selten.

Curetis.

1). Malayica Felder. Alle Arten dieser Gattung sind nicht haufig. Sie

fliegen sehr schnell und kräftig und sitzen meist mit zusammengefalteten Flügeln, auf Büschen, selten auch an Strassenpfützen.

- 2). Sperthis? Felder.
- 3). Barsine Felder.
- 4). Species? Noch nicht bestimmt, gleicht C. Felderi.

Deudory x.

- r). Melampus Cramer. Ueberall häufig, auf Büschen. Auch er pflegt beim Sitzen die Flügel zu schließen und die Hinterflügel schwach an einander zu reiben, wobei der grosse, schwarze Fleck am Winkel der Hinterflügel wie gebrochen absteht und nebst den Anhängseln in zitternde Bewegung zu kommen scheint.
 - 2). Chozeba Hewitson.

Amblypodia.

- 1). Eumolphus Cramer.
- 2). Amphimuta. Felder. Nicht besonders selten. Alle Amblypodia-Arten fliegen nur in buschigen, schattigen Waldern, ziemlich langsam, einige jedoch auch sehr rasch und hestig, gewöhnlich bald wieder sich ins Gelaub verbergend, wobei sie die Flugel zusammenfalten.
 - 3). Agnis Felder. Ebenfalls nicht selten.
 - 4). Amisena Hewitson. Seltener. Rasch fliegend.
 - 5). Atosia Hewitson. Nicht häufig.
 - 6). Narada Horsfield. Ebenfalls.
 - 7). Vivarna Horsfield.
 - 8). Ameria Hewitson. Selten.
 - 9). Anarte Hewitson. Nicht selten.
 - 10). Species? Noch nicht determinirt.
 - 11). Species? Ebenfalls.

IV. PAPILIONIDAE.

1. PIERINAE.

Pontia.

1). Nina Fabricius. Ein häufiges, schwach und langsam fliegendes Thierchen, welches sich meist zwischen Buschen und Gestrauch ziemlich nahe am Boden hält, und beinahe niemals niedersitzt.

Terias.

1). Hecabe Linné. In cultivirten Strecken überall gemein, und dadurch

viel zur Physiognomie der Gegend beitragend. Flug niedrig und anbaltend.

- 2). Harina Horsfield.
- 3). Brigitta, var. Drona Horsfield. Auf der Hochebene von Tobah häufig.

Pieris.

- 1). Paulina Cramer. Nicht gerade häufig, in lichten, sonnigen Waldparcellen.
 - 2). Lyncida Cramer. Häufig.
- 3). Nero Fabricius. Nicht häufig. Ich habe das rasch und unstät fliegendes Thier öfters unter andern Weisslingen an feuchten Stellen auf Waldwegen sitzend, gefangen.
 - 4). Lea Doubleday. Bei Tandjong-Morawa, Serdang.
 - 5). Amasene Cramer.
 - 6). Aibina Boisduval.
- 7). Nathalia Felder. In einem lichten Waldchen von Gluta renghas bei Labuan nicht selten.
- 8). Judith Fabricius. Scheint nicht selten, aber local zu sein. Ich habe drei Exemplare während eines Ausfluges in die Vorberge bei Deli-tua gefangen.
 - 9). Species? Noch nicht bestimmt.

Delias.

- 1). Hyparete Linné. Nicht gerade häufig, noch seltener die var. metarete.
- 2). Belisama Cramer. Nur auf der Hochebene von Tobah, aber dort gemein, liebt besonders die Blüthen der Datap-Bäume (Erythrina).
- 3). Parthenope Wallace. Ebenfalls, aber selten, auf der Hochebene. In den Kustenstrichen wird dieses Thier ersetzt durch die ebenfalls seltene:
- 4). Dione Drury. Fast der einzige Schmetterling, der bis in die auszersten Mangrovebüsche ins Meer hinaus fliegt. Derselbe scheint auf die Kustenstriche beschränkt zu sein.

Hebomoia.

1). Glaucippe Linné. In Deli ist das Thier merkwürdigerweise recht selten, und fliegt stets ausserordentlich hoch, über den Gipfeln der höchsten Baume in reissendem Fluge. Zwei Exemplare habe ich ausnahmsweise an ganz niederen Sträuchern gefangen, wo sie mit zusammengefalteten Flugeln ausruhend sassen. Sie stellten eine etwas dunklere und weniger breit roth gebänderte Localvarietät vor, die man sumatrananennen könnte.

Eronia.

Eine Eronia-Species, vielleicht valeria Cramer, schön apfelgrün mit schwarzen Adern, fliegt auf Waldwegen und an Buschrändern nicht selten, am häufigsten von März bis Mai, aber stets so schnell und flüchtig, ohne auszuruhen und immer gerade aus, dass ich nie derselben habhaft werden konnte.

Catopsilia.

- 1). Pyranthe Linné. Sehr häufig. Auch die von Distant, Tab. XXVI, Fig. 20 abgebildete Varietät kommt vor.
 - 2). ? Philippina Cramer. Ebenfalls.
 - 3). Species? Noch nicht determinirt.
 - 4). Species? Ebenso.
- 5). Scylla Cramer. Kommt nur local, aber dort oft ziemlich häufig, vor, z. B. bei der Stadt Medan.
- 6). Crocale Cramer. Ueberall gemein, und für die Landschaftsphysiognomie characteristisch.
 - 7). Catilla Butler. Etwas weniger häufig.
 - 8). Pomona Fabricius.

2. PAPILIONINAE.

Von dieser wunderbar schön gefärbten Familie haben wir eine stattliche Reihe von Vertretern aufzuzählen. Die Lebensweise dieser Schmetterlinge ist bekannt genug, sodass ich mich auf wenige Bemerkungen beschränken kann.

Ornithoptera.

- 1). Amphrysus Cramer, var., rubricollis. Dieses prachtige, grosse Thier ist sehr häufig und schwebt mit langsamem aber kraftigem Flug durch die Garten und Walder, hie und da eine Blüthe besuchend, aber ohne sich fest niederzulassen. Sie fassen die Blüthe mit den Beinen und bleiben halb schwebend und beständig mit den Flügeln fächelnd davor hängen, um nach ein paar Secunden schon auf die nachste Blüthe überzugehen. Sie bevorzugen besonders die Blümen der Pointiana pulcherrima und es gewährt einen wunderhübschen Anblick, diese herrlichen Thiere an dem von den feuerfarbenen Blüthen überschütteten Baum herumschweben zu sehen.
- 2). Species? Noch nicht definitiv bestimmt; Herr Rogenhofer in Wien halt dieselbe für eine Varietät von pompeus Cramer.

Besonders bei Labuan häufig, und fliegt mit der vorigen Art durcheinander.

3). Brookeana Wallace. Dieser prachtvolle Schmetterling ist nicht gerade sehr selten, liebt schattige Stellen, und sucht gerne Pfützen an Waldwegen auf, kommt aber auch heraus auf die Felder und in die Nahe der Hauser und Hofe, wo ihn besonders die Abfall- und Kehrichthäufen anziehen. Sein Flug ist langsam und majestätisch, wird aber bei Verfolgung zur reissenden Flucht. Leider ist es auch mir nicht geglückt, das weibliche Thier aufzufinden.

Papilio.

- 1). Laodocus de Haan. Ein ziemlich seltenes Thier, das ich einige Male auf dem nassen Land der Bachränder gefangen habe.
- 2). Leucothoe Westwood. Ziemlich selten; kommt nur als Varietat vor, welche eine Uebergang zur var. Schönbergi bildet. Das Thier gleicht dadurch sehr einer Euploea und fliegt auch mit diesen durcheinander in der hellen Sonne an den Buschen herum; nur die mehr mit weiss gezeichneten Hinterflugel lassen dem Geubten den langsam fliegenden Schmetterling richtig erkennen.
- 3). Macareus Godardt. Selten. Wie der vorige den Euploean gleicht und mit ihnen fliegt, so gleicht dieser im Flug gewissen, häufigen Danaiden und tummelt sich unter ihnen herum.
- 4). Antiphus Fabricius. Einer der gemeinsten Schmetterlinge in Deli, überall, nur nicht im Hochwald.
- 5). Demolion Cramer. Nicht gerade häufig, mehr in den bergigen Strecken, wo man ihn stets sehr raschen Fluges dahineilen sieht.
- 6). Polytes Linné. So gemein und an denselben Orten wie antiphus, das Q etwas seltener und in der Farbung stark variirend. Alle Thiere haben lange Anhangsel an den Hinterstügeln, auch die 6.
- 7). Helenus Linné. Ueber das ganze Land verbreitet und nicht selten, am häufigsten an den Pfützen schattiger Waldwege zu fangen.
 - 8). Nephelus Boisduval. Ganz wie der vorige, vielleicht etwas häufiger.
- 9). Albolineatus Fabricius. Auch von diesem, bislang nur von Borneo bekannten Papilio habe ich einige Exemplare gefangen.
- 10). Palinurus Fabricius. Auf sonnigen Waldwegen ein häufiges Thier, das aber auch gern in den Gärten die Lantana-Sträucher besucht, und durch sein prachtvoll schillerndes Goldgrün einen wahren Schmuck der dortigen Gegenden bildet.
 - 11). Species? Auf der Hochebene von Tobah sah ich im Dezember

- 1883 bei Nagasaribu ein zur *Palinurus*-Gruppe gehöriges Thier fliegen, welches zu haschen mir leider nicht gelang, sodass ich ausser Stande bin die Species anzugeben.
- 12). Noctis Hewitson. Selten. Ich habe nur wenige Exemplare an dunkelen, einsamen Stellen des Urwaldes auf den weissen Blüthenbüschen von Pacetta-Sträuchern gefangen, die sie träge umflogen. Doch habe ich auch in einem verwilderten, tiefschattigen Kaffeegarten bei Labuan ein Exemplar gesehen.
- 13). Memnon Linné. In den schattigen Fruchtwäldern von denen die malaiischen Kampongs umgeben sind, sehr häufig. Das Q variirt in mancherlei Weise, jedoch habe ich niemals geschwänzte Exemplare gefunden, wie sie von Java bekannt sind.
- 14). Antiphates Cramer. Nicht selten. An den feuchten Stellen der Strassen in den höheren Gegenden kann man immer ein und das andere Exemplar sitzen sehen. Merkwürdigerweise setzt sich das Thier immer gern mitten unter eine Versammlung von Pieriden (Weisslingen), vielleicht wegen seiner ebenfalls weisslicher Farbung, um dadurch minder aufzufallen?
 - 15). Sarpedon Linné und
- 16). Eurypylus Linné. Beide Thiere häufig und oft zu Dutzenden beisammen in den heissen Morgenstunden an feuchten Wegrändern und Pfützen sitzend. Eurypylus mehr auf die höheren Strecken beschränkt.
- 17). Agamemnon Linné. Beinahe gemein, sehr rasch und unstät die Gärten und Felder durcheilend, nur in der heissesten Zeit sich auf feuchtem Land niederlassend. Er besucht gerne die Lantana-Blüthen, jedoch ohne sich darauf niederzulassen.
- 18). Hageni Rogenhofer. Eine neue Art, nahe bei priapus stehend, welche ich in einem leider sehr beschädigten Exemplar aus dem Karogebiete erhielt. Sie ist beschrieben in: Verhandl. d. K. K. zoologisch-botanischen Gesellschaft, Wien, 1889.
- 19). Sycorax. Auf der Hochebene von Tobah in den Karolandern. Nicht gar zu selten.

Leptocircus.

1). Curius Fabricius. Gemein, aber local. So habe ich das Thier in der Kustenebene bei Labuan und Medan gar nicht, in den Vorbergen jedoch, z.B. bei Tandjong-Morawa, in grosser Menge beobachtet. Der Schmetterling fliegt nur sehr niedrig im Grase und Wegränder, wo sich etwas feuchtere, uppigere Stellen befinden; er flattert unstät von einem

Grashalm zum andern, wobei ihn die langen Anhangsel seiner Hinterfogel etwas zu hindern scheinen, und zeigt sich in seiner ganzen Lebensweise als ein mehr zu den Hesperiden wie zu den Papilioniden gehoriges Thier.

2). Species? Eine noch nicht näher bestimmte Art, vielleicht var. riridis?

V. HESPERIDAE.

Ismene.

- 1). Benjamini Guérin. Selten.
- 2). Chuza Hewitson. Selten. In den Bergstrecken.
- 3). Badra Moore. Selten.

Alle Arten dieser Gattung sind scheue, schnell und kräftig fliegende Thiere, welche sich vorzugsweise in den schattigen Gebüschen der Vorwälder herumtummeln.

Casyapa.

- 1). Thrax Linné. Ein gemeines, sehr fluchtiges Thier, welches man am besten aus der Raupe zieht. Diese lebt schaarenweise auf dem Pisang (Musa), dessen Blattränder sie zu einer mehrere Zoll langen, spiraligen Dute zusammenrollt, welche oft zu mehreren von einem Blatt herabhängen und in dessen Innern das bleichgelbliche Thier haust.
 - 2). Thyrsis Fabricius. Weniger häufig.

Carystus.

1). Irava Moore. Ebenso.

Pamphila.

- 1). Mathias Fabricius.
- 2). Julianus Latreille.
- 3). Sunias Felder. Bis hinauf zur Hochebene von Tobah. Gemein.
- 4). Bambusae.
- 5). Augias Linné. Auf der Hochebene von Tobah.
- 6). Conjuncta Herrich Schaeffer.
- 7). Maesoides Butler. In der Kustenebene. Gemein.

Matapa.

1). Avia Moore. Selten, bei Labuan.

Plastingia.

1). Helena Butler.

Plesioneura.

- 1). Albofascia Moore. In den Vorwaldern nicht selten.
- 2). Acmara.
- 3). Dan Fabricius. Ueberall gemein.
- 4). Feisthameli Boisduval.
- 5). Aurivittata Moore. In Wäldern, nicht sehr häufig.
- 6). Folus Fabricius. Gemein.

Tagiades.

- 1). Fuscula Snellen. Nicht selten.
- 2). Gaua Moore. Ziemlich selten.
- 3). Satampa. Ebenso.
- 4). Sambara Moore. Ebenso.
- 5). Rani Moore. Nicht selten.
- 6). Japetus Cramer.
- 7). Maurus Snellen.
- 8). Trichoneura Felder.
- 9). Phaenicis Hewitson.

Telegonus.

1). Calathus Hewitson.

Antigonus.

1). Angulatus Felder. Nicht sehr häufig.

Hesperia.

- 1). Hyela Hewitson. Sehr selten.
- 2). Species? Sehr selten, bei Labuan. Noch nicht bestimmt.
- 3). Species? Selten, bei Labuan. Noch nicht näher bestimmt.

Isoteinia.

1). Melania Plötz. Sehr selten.

Astictopterus.

- 1). Olivescens Moore. Auf der Hochebene von Tobah nicht selten.
- 2). ? Sindu Felder. Bei Labuan sehr häufig.

B. Heterocera 1).

ŧ.	Cleosiris catamitae Hübner.	32. Nyctemera mülleri Snellen van Vol-
2	Eusemia bisma Moore.	Vollenhoven.
3.	vetula Horsfield, var.	33. » Species?
4.	 proxima Butler. 	34. Histia flabellicornis Fabricius, var.
5.	 aegoceroides Felder. 	selene Cramer.
6.	* mollis Walker.	35. Chalcosia panthona Cramer.
7.	Melittia phoreus Westwood.	36. » phalaenaria Guérin.
8.	Chaerocampa hypothous Cramer.	37. Cyclosia virginalis Herrich Schaef-
9.	> thyelia Linné.	fer.
10.	» celerio Linné.	38. Hypsa dama Fabricius.
11.	silhetensis Boisduval.	39. » caricae Fabricius.
12.	 oldenlandiae Fabr. 	40. » inops Walker.
13.	 clotho Drury. 	41. » egens Walker (= dodeca-
14.	 lucasii Boisduval. 	stigma de Haan).
15.	Elibia dolichus Westwood.	42. Pseudoblabes bifasciata Felder.
16.	Panacra scapularis Herrich Schaef-	43. Enaemia puella Drury.
	fer.	44. Bizone peregrina Walker.
17.	Sphinx convolvuli Linné.	45. Teinopyga haemacta Snellen, nova
18.	Smerinthus socrates Boisduval.	Species.
19.	 ailanti Boisduval. 	46. Hypocrita inclusa Snellen.
		01
20.	Leucophlebia lineata Westwood.	47. » porphyrea Snellen.
	Leucophlebia lineata Westwood. Acherontia styx Westwood.	 47. » porphyrea Snellen. 48. » aurantiaca Snellen, nova
왜.	•	r. F. G
왜.	Acherontia styx Westwood.	48. • aurantiaca Snellen, nova
월. 22.	Acherontia styx Westwood. Syntomis biplagata Snellen.	48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species.
91. 92. 23.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen.	48. * aurantiaca Snellen, nova Species. 49. * Species.
21. 22. 23. 24.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen. imaon Cramer.	48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species.
91. 92. 93. 94. 95.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen. imaon Cramer. hūbneri Boisduval.	48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species. 51. Earias limbana Snellen.
91. 22. 23. 24. 25. 26.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen. imaon Cramer. hūbneri Boisduval. Species. Species.	 48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species. 51. Earias limbana Snellen. 52. * Deiopeia pulchella Linné. — Dieses Thier ist auf der Hochebene am häufigsten, kommt aber auch in
91. 92. 93. 94. 95. 26. 97.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen. imaon Cramer. hūbneri Boisduval. Species. Species. Species.	 48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species. 51. Earias limbana Snellen. 52. * Deiopeia pulchella Linné. — Dieses Thier ist auf der Hochebene am
21. 22. 23. 24. 25. 26. 27. 28. 29.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen. imaon Cramer. hūbneri Boisduval. Species. Species. Species.	 48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species. 51. Earias limbana Snellen. 52. * Deiopeia pulchella Linné. — Dieses Thier ist auf der Hochebene am häufigsten, kommt aber auch in
21. 22. 23. 24. 25. 26. 27. 28. 29. 30.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen. imaon Cramer. hūbneri Boisduval. Species. Species. Species. Species. Nyctemera inconstans Snellen van Vollenhoven.	48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species. 51. Earias limbana Snellen. 52. * Deiopeia pulchella Linné. — Dieses Thier ist auf der Hochebene am häufigsten, kommt aber auch in der Küstenebene vor, gewöhnlich
21. 22. 23. 24. 25. 26. 27. 28. 29.	Acherontia styx Westwood. Syntomis biplagata Snellen. appendiculata Snellen. imaon Cramer. hūbneri Boisduval. Species. Species. Species. Species. Nyctemera inconstans Snellen van Vollenhoven.	48. * aurantiaca Snellen, nova Species. 49. * Species. 50. * Species. 51. Earias limbana Snellen. 52. * Deiopeia pulchella Linné. — Dieses Thier ist auf der Hochebene am häufigsten, kommt aber auch in der Küstenebene vor, gewöhnlich an dem oben bei den Danai-

¹⁾ Die mit einem * ausgezeichneten Arten sind ausschliesslich auf der Hochebene von Tobah gefangen.

54. Arctia strigatula Moore.	84. Scopelodes unicolor Westwood.
55. * » galactina van der Hoeven	85. » pallivittata Snellen,
(= trigonalis Snellen van	nova Species.
Vollenhoven).	86. Limacodes-Species.
56. Phissama interrupta Linné.	87. » Species.
57. » vacillans Moore.	88. » Species.
58. Aloa lactinea Cramer.	89. Miresia nitens Snellen.
59. Spilosoma maculifassia Moore.	90. » argentifera Walker.
60. » Species.	91. Neaera darma Moore.
61. Leucoma egens Felder.	92. » bilinea Moore.
62. » margaritacea Snellen,	93. » trima Moore.
nova Species.	94. » bandura Moore.
63. Laelia-Species.	95. Tagora asclepiadis Felder.
64. * Porthesia-Species.	96. » amoena Moore.
65. Euproctis guttulata Snellen, nova	97. » fabia Cramer.
Species.	98. Ganisa postica Moore, var.?
66. » varia Moore.	99. Attacus atlas Linné.
67. r digramma Boisduval,	100. Antheraea-Species.
nebst Varietät.	101. Trilocha varians Moore.
68. v transversa Moore.	102. Odonestis bheroba Moore, var.?
69. * » flavata Cramer, var.?	103. Gastropacha vishnou Lefebvre.
70. » conspersa Felder.	104. » Species.
71. » fumosa Snellen.	105. Suana bimaculata Moore.
72. » Species.	106. Phragmatoecia sumatrensis Snel-
73. » Species.	len.
74. » Species.	107. Cossus strix Linné.
75. Lymantria lunata Cramer.	108. » terebroides Felder.
76. » brotea Cramer.	109. Zeuzera mineus Cramer.
77. » ? hilaris Snellen van Vol-	110. Hepialus, nova Species.
lenhoven.	111. Leucania pulchra Snellen.
78. » Species.	112. Sesamia albociliata Snellen.
79. Redoa submarginata Butler.	113. Glottula dominica Cramer.
80. Oiketicus crameri Westwood (= va-	114. Amyna selenampha Guenée.
riegata Snellen).	115. Heliothis armigera Hübner.
81. * Harpijia-Species. — Ich fand eine	116. Leocyma vestae Guenée.
Gabelschwanzraupe, welche ganz	117. » apicalis Snellen.
der unserer Harpijia vinula glich,	
bei Nagasaribu auf der Hochebene	119. Eriopus placodoides Guenée.
von Tobah.	120. » nova Species.
82. Olene mendosa Hübner.	121. » nova Species.
83. Phalera javana Moore.	122. » nova Species.

- 123. Penicillaria jocosatrix Guenée.
- 194. Plusia signata Fabricius.
- Plusiodes superba Hübner (= westermanni Guenée).
- 196. Hyblaea constellata Guenée.
- 127. Anomis fulvida Guenée.
- 128. ! Mania-Species.
- 129. Cocytodes modesta van der Hoeven.
- 130. Stictoptera cucullioides Guenée, var.?
- 131. Lophoptera, nova Species.
- 132 Checupa tinctoides Snellen.
- 133. Ophideres fullonica Linné.
- 131. » salaminia Cramer.
- 135. » hypermnestra Cramer.
- 36. » ancilla Cramer.
- 37. sultana Snellen, nova Species.
- 138. Phyllodes eyndhovii Snellen van Vollenhoven.
- 139. Polamophora manlia Cramer.
- 140. » hageni Snellen, nova Species.
- 141. Lygniodes hypoleuca Guenée.
- 142. Sypna-Species.
- 143. Anisoneura hypocyana Guenée.
- 144. Spiredonia feducia Stoll.
- 145. Argiva caprimulgus Fabricius.
- 146. » hieroglyphica Drury.
- 147. Ommatophora luminosa Cramer.
- 148. Hypopyra grandaeva Felder.
- 149. Lagoptera magica Hübner.
- 150. dotata Fabricius.
- 151. Achaea mercatoria Fabricius.
- 152 > cyllota Guenée.
- 153. Athyrma bubo Hübner.
- 154. Ophiusa fulvotaenia Guenée.
- 155. achatina Cramer.
- 156. Grammodes mygdon Cramer
- 157. Remigia archesia Cramer.
- 158. » frugalis Fabricius.

- 159. Remigia xylomiges Snellen.
- 160. Zethes sondaicus Snellen.
- 161. » albonotatus Snellen, nova Species.
- 162. Lacera alope Cramer.
- 163. Ophisma gravata Hübner.
- 164. Hypaetra umminia Cramer.
- 165. Capnodes maculicosta Walker, nebst Varietät.
- 166. Fascellina cervinaria Spellen.
- 167. Nyctalemon patroclus Linné.
- 168. Urapteryx podaliriata Guenée.
- 169. * » columbicola Walker.
- 170. Amblychia angeronaria Guenée.
- 171. Boarmia cornaria Guenée.
- 172. Hypochroma pseudoterpnaria Guenée.
- 173. » crenaria Guenée.
- 174. » ruginaria Guenée.
 - 175. Elphos hymenaria Guenée.
- 176. *Iodis, nova Species.
- 177. Thalassodes quadraria Guenée:
- 178. Eumelea aurelia Cramer.
- 179. flagrata Felder und Rogenhofer.
- 180. Anisodes pardaria Guenée.
- 181. » suspicaria Snellen.
- 182. Micronia obtusata Guenée.
- 183. » caudata Fabricius.
- 184. » aculeata Guenée.
- 185. » caseata Guenée.
- 186. Nedusia luctiferata Snellen.
- 187. Erosia verticaria Felder und Rogenhofer.
- 188. Terpnomicta quadrilineata Snellen, nova Species.
- 189. Macaria sufflata Guenée.
- 190. » eleonora Cramer.
- 191. Petelia medardaria Herrich Schaeffer.
- 192. Plutodes cyclaria Guenée.

193. Omiza strigularia Snellen.

194. Numeria fulvocapitata Snellen.

195. Hazis malayana Guérin.

196. » bellonaria Guenée.

197. » militaris Linné.

198. » ? palmyra Stoll.

199. *Celerena andamana Felder und Rogenhofer. Ein Thier, das ich von der Hochebene von Tobah mitbrachte, und das bis jetzt nur von den Andamanen bekannt war.

200. *Abraxas maculicincta Walker.

201. Hypaena approximalis Snellen, nova Species.

202. * fractilinealis Snellen, nova Species.

203. Simplicia griseolimbalis Snellen nova Species.

204. Nodaria fracturalis Snellen.

205. Pinacia pupillalis Snellen, no Species.

206. Epizeuxis inductalis Snellen.

207. Cydalima, nova Species.

208. Glyphodes crameralis Snellen.

209. Agathodes modicalis Guenée.

210. Hymenoptychis sordida Zeller.

211. Cirrochrista fumipalpis Felde und Rogenhofer.

212. Botys abnegatalis Lederer.

213. Botyodes flavibasalis Moore.

214. Athaloëssa floridalis Zeller.

 ${\bf 215.}\ {\it Pleonectusa\ fabidalis\ Lederer.}$

Coleoptera.

Von den Coleopteren kann ich bis jetzt nur die systematische Liste geben, und diese nicht einmal vollständig, wie man sieht. Es sind noch eine ganze Reihe von Familien und Gattungen zu bearbeiten. Alle neue Arten sind in den »Notes from the Leyden Museum" beschrieben und theilweise abgebildet.

Cicindelidae.

- undulata Dejean.
- » semivittata Fabricius.
- » pumila Dejean.
- holosericea Fabricius.
- nahe verwandt mit Mastersi
 Castelnau.
- » superba Kollar, und 4 noch enbestimmte Arten.

Therates Schaumi Chaudoir.

Tricondyla Wallacei Thomson, und 2 noch unbestimmte Arten.

Collyris apicalis Chaudoir.

- » sarawakensis Thomson.
- > emarginata Dejean.
- » Bonelli Guérin.
- verwandt mit parvula und linearis.
- chloroptera Chaudoir, und 7 noch unbestimmte Arten.

Carabidae.

Hiletus sumatrensis Oberthür, n. sp. Ophionea nigrofasciata Schmidt Goebel. Camonia subapicalis Oberthür, n. sp.

- biguttata Motschulsky, und 2 neue Arten in der Nähe von siamensis. Drypta virgata Chaudoir.
 - dimidiata Putzevs.

Dendrocellus macroderus Chaudoir. Planetes bimaculatus Mac Leay.

- » secernendus Oberthür, n. sp.
- species nova.

Pheropsophus fuscicollis Dejean, nebst Varietät.

» javanus Dejean.

Brachinus Hageni Oberthür, n. sp. Calleida splendidula Fabricius.

- chloroptera Dejean.
- » cupreomicans Oberthür, n. sp., und 3 andere neue Arten.

Physodera Dejeanii Eschscholtz.

Eschscholtzi Parry.

Dolichoctis tenuilimbatus Oberthür, n.sp.

» species nova?

Mochtherus tetraspilotus Mac Leay.

» species.

Celenephes parallelus Schmidt Goebel. Coptodera flexuosa Schmidt Goebel.

- interrupta Schmidt Goebel.
- tetrastigma Chaudoir.

Lobodontus species nova?

Peripristus ater Castelnau.

Serrimargo guttiger Schaum.

Mormolyce phyllodes Hagenbach.

Catascopus elegans Fabricius.

- » fuscoaeneus Chaudoir.
- » angulatus Chaudoir.
- * facialis Wiedemann.
- gracilis Oberthür, n. sp.

Miscelus unicolor Putzeys.

Pericallus cicindeloides Mac Leay.

Picrus obscurus Chaudoir.

Pachyteles species.

Morio Doriae Putzeys.

» grosse Ex. von Doriae?

Morio cucujoides Walker. Scarites sulcatus Olivier.

» semirugosus Chaudoir.

Clivina attenuata Herbst, und 3 noch nicht bestimmte Arten.

Eudema sundaicum Oberthür, n. sp.

Peronomerus fumatus Schaum.

Panagaeus (Dischissus) longicornis Schaum.

Chlaenius femoratus Dejean.

- » ducalis Chaudoir.
- hamifer Chaudoir.
- » binotatus Dejean.
- » lynx Chaudoir.
- » submarginatus Chaudoir.
- » javanus Chaudoir, und 2 noch nicht bestimmte Arten.

Hololius punctulatus Chaudoir.

Oodes siamensis Chaudoir.

» vilis Chaudoir.

Simous species nova.

Orthogonius Mniszechi Chaudoir.

- » sulcipennis Chaudoir.
- » acrogonus Wiedemann.
- » Hageni Oberthür, n. sp.

Actenoncus atratus Buquet.

Trichoglottus punctilabris Mac Leay. Simocranius species, in der Nähe von iridescens Chaudoir.

Hypolithus acutangulus Chaudoir.

Ophonus species, in der Nähe von seriatus Chaudoir.

Platymetopus tortus Mac Leay.

- Thunbergi Quensel.
- species.

Anoplogenius Wallacei Chaudoir. Stenolophus 5-pustulatus Wiedemann.

- » maculiger Chaudoir.
- » rectangulatus Chaudoir.
- » metallescens Bohemann, und 2 noch nicht bestimmte Arten.

Trigonotoma, mit 3 wahrscheinlich neues Arten.

Anchomenus species.

Drimostoma rectangulum Chaudoir.

» species.

Triplogenius viridicollis Mac Leay.

Abacetus antiquus Dejean.

Dicranoncus amabilis Chaudoir.

Selina Ritsemae Oberthür, n. sp. Dytiscidae.

Hydrovatus ferrugatus Régimbart.

- » acutus Sharp.
- » atricolor Régimbart.

Hydrocanthus indicus Wehncke, Var

Canthydrus angularis Sharp.

Laccophilus flexuosus Sharp (Aubé?)
Rhantus pulverosus Stephens, Varietät
discicollis Aubé.

Copelatus tenebrosus Régimbart.

» nova species.

Cybister chinensis Motschulsky (indicas Aubė).

- » tripunctatus Olivier.
 - sumatrensis Régimbart.

Eretes sticticus Linné.

Hydaticus vittatus Fabricius.

- » leander Rossi, Varietät ru fulus Aubé.
- » pacificus Aubé, Varietät. Rhantaticus signatipennis Aubé.

Gyrinidae.

Gyrinus convexiusculus Mac Leay.
Porrorhynchus marginatus Laporte.
Orectochilus spiniger Régimbart.

Hydrophilidae.

Sternolophus, mit 2 Arten.

Philhydrus, mit 5 Arten.

Berosus species.

Volvulus species.

Hydrophilus species.

Amphiops, mit 2 Arten.

Cyclonotum, mit 3 Arten. Sphaeridium, mit 2 Arten.

Paussidae.

Paussus Waterhousei Westwood? Staphylinidae.

Hyrmedonia apiciventris Fauvel. Coenonica puncticollis Kraatz, Tachinoderus fulvipes Erichson.

Saphylinus chalceus Fauvel.

Philonthus longicornis Stephens.

- partitus Fauvel.
- · erythropus Kraatz.
- variipennis Kraatz.
- carnifex Fauvel.

Acylophorus nova species.
Belonuchus aeneipennis Fauvel.

» mutator Fauvel, Var.

- Platyprosopus consularis Fauvel.
 Paederus fuscipes Curtis.
 - tamulus Erichson.
 - » sondaicus Fauvel.
 - » chilensis Fauvel.

Osorius cordicollis Fauvel.

nova species.

Leptochirus tridens Motschulsky.

nova species.

Rhyncochilus (Sharp i. l.) nova species.

Novum genus, nova species.

Scaphididae.

Scaphidium grande Gestro.

Historidae.

Hololepta indica Erichson.

» elongata Erichson.

Plaesius javanus Erichson.

Apobletes tener Marseul.

Platysoma birmanum Marseul.

- confucii Marseul.
- » humile Erichson.
- Hageni Marseul n. sp.

Phelister glaucus Marseul n. sp. Hister morphon Marseul. Hister bifrons Marseul.

Nitidulidae.

Carpophilus foveicollis Murray, Var.

- vittiger Murray.
- » pallescens Murray, und 3

noch unbestimmte Arten.

Brachypeplus species.

Mystrops orientalis Olliff, n. sp.

Ischaena angustata Erichson.

Lasiodactylus glabricola Candèze.

Prometopia quadrimaculata Motsch.

Camptodes species.

Amphicrossus discolor Erichson, und 2

oder 3 andere Arten.

Cryptarcha Ritsemae Olliff, n. sp.

Helota Vigorsi Mac Leay.

Ips japonia Motschulsky.

Trogositidae.

Acrops punctata Fabricius.

Latolaeva ovalis Mac Leay.

Colvdidae.

Trachypholis Bowringi Wollaston.

» hispida Weber, und 2

andere Arten.

Bothrideres nocturnus Pascoe.

» species.

Dastarcus porosus Walker.

Rhysodidae.

Rhysodes species.

Cucujidae.

Passandra elongatula Grouvelle.

Hectarthrum trigeminum Newman.

Ancistria retusa Fabricius.

Laemophloeus pusillus Schönherr.

Dermestidae.

Dermestes vulpinus Fabricius.

» cadaverinus Fabricius.

Trogoderma species.

Byrrhidae.

Dendrodipnis grandis Reitter.

» Hageni Reitter, n. sp.

Dendrodipnis Ritsemae Reitter, n. sp.

- » punctulatus Reitter, n. sp.
- » marginatus Reitter, n. sp.

Chelonarium orientale Reitter.

- » irroratum Reitter, n. sp.
- unifasciatum Reitter, n.sp.
- fascicolle Reitter, n. sp. Parnidae.

Parnus species.

Helichus elongatus Reitter.

Sostea secuta Pascoe.

Lucanidae.

Metopodontus occipitalis Hope.

- » sericeus Westwood.
- Mohnikei Parry.

Cyclommatus faunicolor Hope.

» species?

Prosopocoilus species.

Odontolabis Dalmani Hope.

- » bicolor Olivier.
- » Sommeri Parry.

Chalcodes aeratus Hope.

Eurytrachelus titan Boisduval.

- » purpurascens Vollenh.
- » Hansteini Albers.

Aegus capitatus Westwood.

- » ogivus H. Deyrolle.
- malaccus Thomson.

Gnaphaloryx squalidus Hope.

- taurus Fabricius.
- Figulus marginalis Ritsema.

» mediocris H. Deyrolle.

Nigidius Hageni Ritsema nova species.

Cardanus sulcatus Westwood.

Passalidae.

Leptaulax dentatus Weber.

- » bicolor Fabricius.
- » innocuus Buquet, und 4 an-

dere Arten.

Eriocnemis tridens Wiedemann.

Aceraius emarginatus Weber.

Aceraius grandis Burmeister.

» borneanus Kaup.

Scarabaeidae.

(Coprini).

Paraphytus(Xynophron)Ritsemae Harold.

Caccobius, mit 2 Arten.

Gymnopleurus melanarius Harold.

Anoctus laevis Harold.

Heliocopris Sturleri Harold.

Catharsius Molossus Linné.

Copris Numa Lansberge.

- » Doriae Harold.
- » Haroldi Lansb. (Tullius Harold)

Onitis Hageni Lansberge, n. sp. Onthophagus babirussa Eschscholtz.

- » Mülleri Lansberge.
- » ventralis Lansberge, n. sp.
- rutilans Sharp.
- » pacificus Lansberge.
- » oblongomaculatus Lansberge, n. sp.
- » Hageni Lansberge, n. sp.
 - rugicollis Harold.
- » serdangensis Lansberge, nova species.
- » hirsutulus Lansberge.
- » denticollis Lansb., n. sp.
- » incisus Harold.

Oniticellus femoratus Illiger.

» tessellatus Harold.

Aphodius marginellus Fabricius.

- lividus Olivier.
- » Reichei Harold.
- » urostigma Harold.

Rhyssemus malasiacus Lansberge, n. sp. Bolboceras sumatranus Lansberge, n. sp.

Cassolus nudus Sharp.

Phaeochrous emarginatus Castelnau.

Trox chinensis Bohemann.

Liparochrus derasus Harold.

Sphaeromorphus Gestroi Harold.
(Melolonthini).

Heplia, mit 5 unbestimmten Arten. Serica, mit 8 unbestimmten Arten. Apogonia laevicollis Lansberge.

- » setulosa Sharp.
- simplex Sharp.
- » scutellaris Sharp.
- brevis Sharp, und 4 Arten welche nicht n\u00e4her bestimmt sind.
 Lepidiota stigma Fabricius.
 - pauper Vollenhoven.
 - » lateralis Deyrolle.

lescopholis rorida Weber.

- » species.
- lachnosterna pumila Sharp.
 - » miranda Sharp, und 11 noch nicht bestimmte Arten.

Aplidia leucophthalma Wiedemann.

discedens Sharp.

Melolontha hispida Burmeister.

rugosa Vollenhoven.

Pachydema nova species.

(Rutelini).

Anomala breviceps Sharp.

- · cuprascens Wiedemann.
 - » assimilis Dejean, Varietät.
 - · chalcescens Sharp.
 - · cupripes Hope, nebst Var.
 - semipurpurea Burmeister.
 - chalcites Sharp.
 - ? pulchripes Lansberge.
 - perplexa Hope, Varietät.
 - flagellata Sharp, und 6 un-

bestimmte Arten.

Mimela debilis Sharp.

Singhala nova species.

Popilia foveolata Sharp, nebst Var. Parastasia rugosicollis Blanchard.

Adoretus umbrosus Fabricius.

species.

(Dynastini).

Heteronychus species.

Oryctes rhinoceros Linné.

» trituberculatus Lansberge.

Xylotrupes Gideon Linné.

Chalcosoma atlas Linné.

(Cetonini).

Diceros malayana Wallace.

Coryphocera sexmaculata Fabricius.

Clinteria Hageni Ritsema, nova species.

» serdangensis Lansberge, n. sp. Lomaptera agni Wallace.

Agestrata de Haani Gory & Percheron. Macronota regia Fabricius.

- monacha Gory & Percheron.
- » Rafflesiana Westwood, Var.
- » Diardi Gory & Percheron.
- » quadrilineata Gory & Perch. Glycyphana malayensis Guérin.
 - » 4-color Wiedemann, Var.
 - » pygmaea Mohnike.
 - » venusta Ritsema, n. sp.

Protaetia mandarinea Weber.

Macroma flavoguttata Vollenhoven.

Valgus Vethii Ritsema.

» pilosus Ritsema.

Buprestidae.

Catoxantha opulenta Gory.
Callopistus Castelnaudi H. Deyrolle.

Chrysochroa fulminans Fabricius.

- » Castelnaudi H. Deyrolle.
- Chalcophora pyrostictica Vollenhoven.
 - » Lambii E. Saunders.

Iridotaenia nova species.

Belionota scutellaris Weber.

» fallaciosa H. Deyrolle.

Melobasis species.

Chrysobothris nigripennis H. Deyrolle.

» bistripunctata H. Deyrolle.
Coraebus species.

Melyboeus species.

Agrilus armatus Fabricius, und 4 unbestimmte Arten.

Endelus empyreus H. Deyrolle.

Eucnemidae.

Mit 17 Arten.

Elateridae.

Agrypnus sobrinus Candèze, n. sp.

- Hageni Candèze, n. sp.
- » rubiginosus Candèze.
- » javanus Candèze.

Adelocera modesta Boisduval.

Lacon modestus Candèze.

- » fibrinus Candèze.
- » sinensis Candèze.
- » pallidus Candèze.
- » reductus Candèze.

Meristhus scobinula Candèze, Varietät. Agraeus Mannerheimi Candèze.

Alaus lacteus Fabricius.

- » nubilus Candèze.
- » lophura Candèze.
- » hurria Candèze.
- » Wallandi Candèze, nova species. Oxynopterus Audouini Hope.

Anathesis laconoides Candèze.

Sossor (nov. gen.) Hageni Candèze, n. sp. Melanthoides nitidus Candèze.

Anchastus serdangensis Candèze, n. sp.

- » simulans Candèze, n. sp.
- Megapenthes inficetus Candèze, n. sp.
 - » anceps Candèze, n. sp.
 - » junceus Candèze.

Melanoxanthus zebra Wiedemann.

- » granum Candèze.
 - » ruptus Candèze, n. sp.
 - » fractus Candèze.
 - » 10-maculatus Candèze, nova species.

Cardiophorus rubiginosus Candèze.

» javanus Candèze, Varietät.

Diploconus umbilicatus Candèze.

Diploconus nigripennis Candèze, Van Melanotus carinatus Candèze.

- » hapatesus Candèze.
- p fuscus Fabricius.
- species (fusco affinis).
- » gobius Candèze.

Corymbites cirratipilis Candèze.

Allotrius quadricollis Castelnau.

Ludius illotipes Candèze.

- » macassariensis Candèze. Agonischius pectoralis Candèze.
 - » elegans Candèze, n. sp.
 - » aeneipennis Kirsch.
 - » mirus Candèze.
 - » conspurcatus Candèze,n s
 - » conspurcatus Candèze, Va rietat oder neue Art.
 - » Castelnaui Candèze.
 - » bimaculatus Candèze, Vi rietät unicolor.

Glyphonyx frontalis Candèze.

Hemiops crassa Gyllenhal.

Cebrionidae.

Cebriorhipis basipennis Fairmaire. Rhipidoceridae.

Callirhipis javanica Castelnau.

- » angustior Fairmaire.
- » scutellata Fairmaire, n. sp
- » lineata Waterhouse,

Simianus terminatus Fairmaire, n. s

» ustulatus Fairmaire, n. sp. Dascillidae.

Dascillus fulvulus Wiedemann.

Scirtes species.

Lycidae.

Lycostomus species.

Metriorrhynchus inaequalis Fabricius und 3 unbestimmte Arten.

Bulenides obsoletus Waterhouse.

» pauper Waterhouse.

Conderis, mit 3 Arten.

siochromus melanurus Waterhouse.

> velutinus Waterhouse.

Ditoneces, mit 3 Arton.

richalus communis Waterhouse, und 5 noch nicht bestimmte Arten.

Lampyridae.

vrocoelia terminata Gorham.

consobrina Olivier.

esta nova species.

uciola pallescens Gorham, und 2 andere Arten.

Telephoridae. ylocerus pectoralis Fabricius. elephorus viridanus Gorham.

- » ruficornis Fabricius.
- » varicornis Gorham.
- angusticollis Gorham.
- » species.

olemius, mit 2 neuen Arten.

lis simplex Gorham.

hamatus Gorham, und 2 andere

hthyurus Hageni Ritsema, n. sp. arphurus dispar Erichson, und 2 andere Arten.

rionocerus coeruleipennis Perty.

bicolor Redtenbacher.
 Cleridae.

lit ungefähr 19 Arten.

Lymexylonidae.

tractocerus species.

lylecoetus javanicus Chevrolat.

Apatidae.

Apate lifuana Montrouzier. Kylopertha nicobarica Redtenbacher.

» species.

Tenebrionidae. Opatrum acutangulum Fairmaire.

» mustelinum Fairmaire.

Bolitophagus, mit 8 nicht bestimmten

Bradymerus species.

Leiochrinus lutescens Westwood.

- » fulvescens Westwood.
- » discoidalis Westwood.

Oplocephala, mit 4 unbestimmten Arten. Ceropria superba Wiedemann.

» induta Wiedemann.

Hemicera splendens Wiedemann. Uloma denticornis Fairmaire.

- » picicornis Fairmaire.
- » rufilabris Fairmaire.
- » contracta Fairmaire, und 2 unbestimmte Arten.

Alphitobius species.

Toxicum 4-corne Fabricius.

- » sumatrense Fairmaire.
- » distinctum Fairmaire.
- » species.

Nyctobates impressa Fabricius.

- » podagra Fairmaire, Varietät.
- » semisulcatus Fairmaire.
- » aereipennis Fairmaire.
- » granifera Fairmaire.
- » species.

Pseudobates coracina Fairmaire.

Encyalesthus aeruginosus Fabricius, und

3 noch nicht bestimmte Arten.

Necrobioides species.

Lyprops, mit 2 Arten.

Pseudolyprops dilaticollis Fairmaire.

Heterotarsus inflatus Lacordaire.

Artactes corruscus Fairmaire.

Scotaeus corallipes Hope.

Eucyrtus pretiosus Lacordaire.

» anthracinus Kraatz, und 3 noch unbestimmte Arten.

Platycrepis interstitialis Fairmaire, und

7 unbestimmte Arten.

Gauromaia dives Pascoe.

» Hasseltii Fairmaire, und 8 noch nicht bestimmte Arten.

Tetraphyllus species.

Homoeogenus laticorne Waterhouse.

Periphanes orichalceus Fairmaire.

Amarygmus cuprarius Fabricius, und 2 andere Arten.

Dietysus ovoideus Fairmaire, nebst Var.

- longicrus Fairmaire.
- » picitarsis Fairmaire.
- » species.

Plesiophthalmus, mit 2 Arten.

? Rhygmodus species.

Strongylium orientale Mäklin.

- » cyanicolle Fabricius, und 6 unbestimmte Arten.
- » flavitarse Fairmaire.

Coelolophus Ritsemae Fairmaire. Cistelidae.

Allecula crassipes Fairmaire, und 6 noch nicht bestimmte Arten.

Cteniopus pygialis Fairmaire, Varietät?

» species.

Monommidae.

Monomma Doriae Gestro.

Melandryidae.

Dapsiloderus (novum genus) costipennis

Fairmaire, nova species.

Lagriidae.

Lagria cineracea Fairmaire.

- » hemichlora Fairmaire.
- » rufofusca Fairmaire.
- » lemoides Fairmaire, und 2 unbestimmte Arten.

Casnonidea, variipennis Fairmaire, nova species.

- » apicicornis Fairmaire, nova species.
- » nucea Fairmaire, n. sp. Pedilidae.

Ischalia indigacea Pascoe.

Anthicidae.

Formicomus brahminus Laferté.

Formicomus ruficollis Saunders.

- serdangus Marseul, n. sp.
- » humeralis Marseul.

Anthicus hirtisetosus Marseul, n. sp. Mordellidae.

Mordella tricolor Wiedemann, und 8 unbestimmte Arten.

Cantharidae.

Horia cephalotes Olivier.

Cissites testacea Fabricius.

Epicauta ruficeps Illiger.

Zonitis holoxantha Fairmaire, n. sp.

» macroxantha Fairmaire, n. sp. Oedemeridae.

Ananca sculpticollis Fairmaire, n. sp.

» species.

Curculionidae.

Blosyrus asellus Olivier und 3 noch nicht bestimmte Arten.

Episomus pauperatus Wiedemann, Varietät chlorostigma Wiedemann.

» species.

Myllocerus subvirens Dalman.

- » scapularis Roelofs.
- » species.

Cyphicerus, mit 2 Arten.

Phytoscaphus lixabundus Bohemann, und 3 unbestimmte Arten.

Eugnathus alternans Schönherr.

» species.

Cleonus bisignatus Roelofs.

Lixus mucoreus Dejean.

» semiobliquus Jekel, und 4 unbestimmte Arten.

Paipalesomus species.

Hylobius, mit 3 Arten.

Aclees, mit 3 Arten.

Paramecops species.

Cylas turcipennis Schönherr.

Apoderus cygneus Fabricius.

» tranquebaricus Fabricius.

Apoderus notatus Fabricius.

- » biguttatus Fabricius.
- palliatus Vollenhoven.
- hystrix Fabricius, und 3 unbestimmte Arten.

Attelabus bispinosus Gylh., nebst Var.

species.

Rhynchites, mit 8 unbestimmten Arten.
Balaninus, mit 2 unbestimmten Arten.
Anthonomus species.

Alcides angulus Schönherr.

- · cinctus de Haan.
- pectoralis Bohemann.
- reticulatus Fabricius, und 4 unbestimmte Arten.

Acienemis, mit 3 Arten.

Demidophorus species.

Colobodes species.

Comptorrhinus tibialis Sparmann, nebst Varietät, und 3 andere Arten.

Tragopus species.

Cyamabolus, mit 6 unbestimmten Arten. Enthyrrhinus species.

Cryptorrhynchus, mit 5 unbestimmten Arten.

Apries eremita Pascoe, und 4 andere

Ganyopis leucura Pascoe.

Chirozetes sphaerops Wiedemann.

species.

Mecopus bispinosus Weber.

species.

Baris virgata Bohemann.

species.

Cyrtotrachelus species?

Protocerius colossus Olivier.

Rhynchophorus schach Fabricius, und

2 andere Arten.

Ommatolampus nova species.

Sphenocorynus 4-punctatus Fabricius.

» species.

Oxypygus acutus Fabricius.

- exclamationis Wiedemann.
- species.

Neoxides bilineatus Pascoe.

Cercidocerus fabricator Gyllenhal.

- » fabrilis Gyllenhal.
- » heros Pascoe.

Sphenophorus sericans Wiedemann.

- » sordidus Germar.
- » planipennis Schönherr,

und 5 unbestimmte Arten.

Calandra? exarata Dejean.

Cryptoderma discors Fabricius.

» Fabricii Ritsema.

Sipalus gigas Fabricius.

Cossonidae.

Wahrscheinlich 6 Arten.

Scolytidae.

Dactylipalpus transversus Chapuis.

Acanthurus (nov. gen.) Ritsemae Eichh., nova species.

Xyleborus Kraatzi Eichhoff.

Crossotarsus Wallacei Chapuis.

» species.

Platypus turbatus Chapuis.

Brenthidae.

Calodromus Hageni Power (in litteris).

Cyphagogus gracilis Power.

Cerobates sexsulcatus Motschulsky.

Trachelizus bisulcatus Lund.

- » rufovittatus Perroud, nebst Varietät oder neue Art.
- » cylindricornis Power.
- » Beccarii Power.

Miolispa dimidiata Power.

- » pulla Power (in litteris).
- » javanica Power.
- » fusca Power.

Prophthalmus tridentatus Fabricius.
Baryrrhynchus dehiscens Schönherr.

» miles Bohemann.

Baryrrhynchus pulverulentus Power.
Agriorrhynchus undulatus Power.
Orychodes serrirostris Lund.
Megacerus pubescens Kirsch.
Hormocerus reticulatus Lund.
Schizotrachelus madens Lacordaire.

- » cameratus Lacordaire. Heteroplites unicolor Chevrolat. Diurus forcipatus Westwood.
 - » mucronatus Power.
 - » infucatus Power.

Anthribidae.

Mecocerus allectus Pascoe.

species.

Sintor vittatus Kirsch, und 3 andere Arten.

Acorynus, mit 3 unbestimmten Arten.
Cedus, mit 3 unbestimmten Arten.
Nessiaria, mit 3 unbestimmten Arten.
Zygaenodes wollastoni Pascoe.
Xenocerus species.

Xylinades Westermanni Schönherr.

- » marmoratus Roelofs.
- » species.

Eucorynus crassicornis Fabricius. Dendrotrogus perfolicornis Fabricius.

» species.

Basitropis, mit 3 unbestimmten Arten.
Phloeobius species.

Araeocerus fasciculatus de Geer.

» species.

Trictenotomidae.

Trictenotoma Childrenii Gray.

Cerambycidae.

(Prionini).

Cyrtognathus planicollis Bates.

Ancyloprotus ferox Lansberge, n. sp.

Zarax eurypodioides Pascoe.

Aegosoma marginale Fabricius.

» granuliferum Lansberge, nova species.

Noserius tibialis Pascoe.

Xystrocera globosa Olivier.

Pachydissus, mit 2 Arten.

Rhytidodera simulans White, und 5 andere Arten.

(Cerambycini).

Zegriades magister Pascoe.

Gnatholea eburifera Thomson.

» subnuda Lacordaire.

Ceresium, mit 3 Arten.

Examnes species.

Dejanira quadripunctata Thomson.

Merionoeda subulata Pascoe, Varietät'

und 2 andere Arten.

Ephies ligystropteroides Lansberge,n.sp Euryarthrum albocinctum Blanchard. Pachyteria Hageni Ritsema, n. sp. Chloridolum, mit 2 Arten. Clytanthus annularis Fabricius.

- » sumatrensis Laporte & Gory.
- » albofasciatus Laporte & Gory.
- » javanicus Laporte & Gory, un

5 unbestimmte Arten.

Cleomenes dihammophoroides Thomson

Euruclea cardinalis Thomson.

Eurycephalus Lundi Fabricius.

Philagathes sanguinolentus Olivier.
Cladopalpus (novum genus) Hagen

Lansberge, nova species.

Noëmia apicicornis Ritsema, n. sp.

(Lamiini).
Tachystola scabripennis Dejean.

Archidice verrucosa Pascoe.

» epicedioides Pascoe.

- Epepeotes luscus Fabricius.
 - » meridianus Pascoe.
 - » vestigialis Pascoe.

 ${\it Monohammus\ fistulator\ Germar.}$

» species.

Cereopsius arbiter Pascce.

» spilotus Pascoe.

Combe brianus White. Marmaroglypha sumatrana Ritsema. Enthyastus binotatus Pascoe.

Batocera albofasciata de Geer.

- Sabina Thomson.
- Thomsoni Javet.
- iavanica Thomson.
- Helena Thomson.

Apriona flavescens Kaup.

cylindrica Thomson.

Gnoma longitarsis Pascoe.

Anancylus species.

Agelasta species.

Optops lichenea Pascoe.

Palimna tessellata Pascoe.

Ilysia tricincta Castelnau.

Xylorhiza venosa Latreille.

Cylindropomus peregrinus Pascoe.

species.

Olenecumptus bilobus Fabricius.

- cordiger Vollenhoven.
- oplatus Pascoe.

Nyctimene agriloides Thomson.

Trachelophora species.

Grammoechus polygrammus Thomson.

Almodes marmorea Schönherr.

Mochotypa suffusa Pascoe.

Aelara species.

Cyardium cribrosum Pascoe.

Prometha melanura Pascoe.

quadraticollis Pascoe, und 7 unbestimmte Arten.

Sthenias franciscanus Thomson.

Pascoei Ritsema, nova species.

Apomecyna neglecta Pascoe.

Rapica, mit 3 nicht bestimmten Arten. Sybra, mit 2 nicht bestimmten Arten.

Pothyne, mit 3 nicht bestimmten Arten.

Anandra, mit 2 nicht bestimmten Arten.

Cleptometopus filifer Pascoe.

species.

Tetraglenes fusiformis Pascoe.

Ostedes, mit 3 nicht bestimmten Arten.

Rondibilis species.

Eoporis elegans Pascoe, Varietät?

Exocentrus, mit 3 nicht bestimmten Arten.

Bacchisa singularis Ritsema, n. sp. Glenea juno Pascoe.

honora Pascoe.

- speciosa Dejean.
- delia Thomson.
- camilla Pascoe.
- funerula Thomson.
- manto Pascoe.
- numerifera Thomson, und einige nicht bestimmte Arten.

Daphisia pulchella Pascoe.

Nupserha fricator Dalman.

species.

Dystus notator Pascoe.

species.

Oberea insoluta Pascoe.

limbata Pascoe, und 3 nicht bestimmte Arten.

Astathes nitens Fabricius.

- Daldorfii Fabricius.
- divisa Pascoe.

Tropimetopa simulator Pascoe.

Chreonoma nigriventris Pascoe.

species.

Chrysomelidae.

(Sagrinae).

Sagra splendida Weber.

(Criocerinae).

Lema quadripunctata Olivier.

- femorata Guérin.
- Gestroi Jacoby.
- haematomelas Lacordaire.
- palpalis Lacordaire. *
- fulvula Lacordaire.
- coromandeliana Fabricius.

Lema Beccarii Jacoby, und 2 nicht bestimmte Arten.

Crioceris quadripustulata Fabricius.

impressa Fabricius.

(Clytrinae).

Aspidolopha Buqueti Lacordaire.

imperialis Baly.

Gynandrophthalma luteicollis Lacordzire.

(Cryptocephalinae).

Dioryctus grandis Baly.

Melixanthus bimaculicollis Baly.

» sumatrensis Jacoby.

Cryptocephalus cinnabarinus Suffrian.

apicipennis Baly. (Eumolpinae).

Nodostoma Bohemanni Baly.

- » frontale Baly.
- » aeneipenne Baly.
- » Beccarii Jacoby.
- » aeneomicans Baly.

Pagria sumatrensis Lefèvre.

Callisina fasciata Baly.

integricollis Jacoby, n. sp.
 Scelodonta nitidula Baly.
 Aoria nigripes Baly.
 Aulexis Wallacei Baly.

» pallida Lefèvre.
Bromius hirtus Fabricius.

Heteraspis (Bromius) vestita Baly.

» evanescens Baly.

Rhyparida pinguis oder ovalis Baly.
Pyropida sumptuosa Baly.

Phytorus dilatata Jacoby.

» simplex Lefèvre.
Colasposoma mutabile Baly.

Abirus piceipes Baly.

- » flavopilosus Jacoby.
- » Hageni Lefèvre, nova species.
- subrugosus Jacoby, nova species.
 Cleorina fulvitarsis Lefèvre.

Aulacolepis decorata Baly.

Corynodes basalis Jacoby, nova specie

- » egenus Lefèvre.
- » species.

Chrysochus Hageni Jacoby, nova speciel Colaspoides apicicornis Jacoby.

- » glabrata Jacoby.
 - » Rafflesii Baly.
- Hageni Lefèvre, n. sp. (Chrysomelinae).

Agasta formosa Hope.

Chalcolampra 18-guttata Fabricius.

violaceipennis Jacoby.
 (Halticinae).

Acrocrypta fulvicollis Jacoby. Nisotra gemella Erichson.

» species.

Graptodera cyanea Fabricius.

Lactica suturalis Jacoby, nova species

- Aphthona sumatrana Jacoby, n. sp.

 vanea Jacoby, nova species
- Sphaerometopa acroleuca Wiedemann Psylliodes Balyi Jacoby.
 - » Chapuisi Baly.

Imolia nigrofasciata Jacoby. Sebaethe lusca Fabricius.

- » sumatrana Jacoby, nova species
- » affinis Jacoby, nova species.
 - variabilis Jacoby.

Ophrida guttata Chapuis.

Argopus angulicollis Clark.

Euphitrea Wallacei Baly.

Hyphasis parvula Jacoby. Sphaeroderma apicipennis Baly.

- » parvula Jacoby, n. sp
- » striatipennis Jacoby.

Eucycla varipes Jacoby.

Homelea (nov. gen.) variabilis Jacoby, nova species.

(Galerucinae).

Oides pectoralis Clark.

Oides metallica Jacoby.

- : albicans Duvivier, nova species.
 - » dimidiata Guérin.
 - atripennis Fabricius.
 - luteicornis Fabricius.
 - Batesi Jacoby.
 - 6-punctata Olivier, Var.
 - quadraria Olivier.
 - cornuta Baly.
 - abdominalis Fabricius.
 - coffeae Hornstedt.
 - > flavomarginata Duvivier.
 - » Ritsemae Duvivier.
 - palliata Schaller, und 8 noch nicht bestimmte Arten.
- Pseudocophora Buqueti Guérin.

 * uniplagiata Jacoby,

 nova species.

Rhaphidopalpa serena Bohemann. Macrima abdominalis Jacoby.

- subcostata Jacoby, n. sp.
- malayensis Jacoby, n. sp.

Phyllobrotica unicolor Illiger.

Malacosoma cyanicollis Jacoby, n. sp. Mimastra submetallica Jacoby.

Sumatrasia unicolor Jacoby.

Sumatrasia unicolor Jacoby. Cerophysa sumatrensis Jacoby.

Glyptolus viridis Jacoby.

Areastes biplagiata Baly.

- » suturalis Jacoby, nova species. Galerucella rugosa Jacoby.
- Hageni Jacoby, nova species.
 Orthoxia Boisduvali Dejean.

Sastroides (nov. gen.) bimaculata Jacoby, nova species.

- unicolor Jacoby, nova species.

 Menippus Clarki Jacoby, nova species.

 Sermyloides basalis Jacoby, Varietät.

 Haplosonyx albicornis Wiedemann.
 - » sumatrae Weber.

Haplosonyx nigricollis Duvivier. Caritheca quadripustulata Baly.

- » sumatrensis Jacoby.
- Antipha seminigra Jacoby, Varietät.
 - » capitata Jacoby, Varietät.
 - » bifasciata Jacoby, nova species.
 - » apicipennis Jacoby, nov. spec.

Monolepta elegantula Bohemann.

» basalis Jacoby.

Ochralea nigricornis Clark, Varietät?

marginata Jacoby.

Doryida Balyi Duvivier, nebst Var.

Metellus laevipennis Jacoby.

Neolepta (nov. gen.) fulvipennis Jacoby, nova species.

- biplagiata Jacoby, nova species.

 Eustetha variabilis Jacoby, nova species.

 Ozomena (Theopea) impressa Fabricius.
 - » pulchella Baly.
 - » ? elegantula Baly.
 - » » Weyersi Duvivier.
 - » variabilis Jacoby, nova species.
 - » » species.

Platyxantha nigripennis Jacoby, n. sp. Metrioidea (?) apicalis Jacoby, n. sp. Coeligetes (novum genus) submetallica Jacoby, nova species.

Aenidea laeta Baly.

» sumatrensis Jacoby, n. sp. Neocharis fulvicollis Jacoby, Varietät. Erotylidae.

(Languridae).

Pachylanguria metasternalis Crotch. Tetralanguria elongata Fabricius.

» splendens Wiedemann, Varietät aenea Fowler.

Languriosoma Brooki Crotch.

Oxylanguria acutipennis Crotch.

Languria nigrina Wiedemann (= scutellata Crotch).

Languria melanosterna Harold.

- longicollis Fowler, n. sp.
- cuneiformis Crotch.
 (Erotylidae).

Encavstes malayana Guérin.

- lunulata Mac Leay.
- Hageni Gorham, nova species.
- » sulcata Gorham, nova species.

Megalodacne luteoguttata Crotch. Micrencaustes sexguttata Gorham, n. sp. Triplatoma Macleayi Lacordaire.

- » Gestroi Bedel.
- » attenuata Crotch.
- bizonata Crotch.

März 1890.

Aulacochilus sericeus Bedel.

- » micans Bedel.
- » tetraphacus Bedel.
- » Doriae Bedel.
- » crucis-melitae Gorham, nova species.

Episcapha quadrimaculata Wiedemann Episcaphula elongata Guérin.

Und noch einige Arten von:

Hispidae,
Cassidae,
Endomychidae,
und Coccinellidae.

DR. B. HAGEN.

DIE KEI-INSELN UND IHR VERHÄLTNISS ZUR AUSTRALISCH-ASIATISCHEN GRENZLINIE,

ZUGLEICH EIN BEITRAG ZUR GEOLOGIE VON

TIMOR UND CELEBES

VON

K. MARTIN.

Den Ausgangspunkt der nachfolgenden Untersuchungen bildete eine Sammlung von Gesteinen, welche Herr C. J. M. Wertheim im Auftrage der Geographischen Gesellschaft zu Amsterdam am Ende des Jahres '88 und im Beginne von '89 zwecks geologischer Aufnahme auf den Keilnseln angelegt hatte. Das Studium der Sammlung, welche durch die Güte der genannten Gesellschaft an das Leidener Museum überging, wurde durch eine Kartenskizze unterstützt, in die Wertheim die betreffenden Gesteinsnummern nach den Fundorten eingetragen hatte, sowie durch einige mündliche und schriftliche Erläuterungen.

Anfangs lag es nur in der Absicht, eine oberflächliche Prufung, deren Ergebniss in einem vorläufigen Reiseberichte Platz finden sollte, vorzunehmen; doch stellte sich alsbald heraus, dass die Kei-Inseln von allgemeinerer Bedeutung für die Beurtheilung der continentalen Grenze Australiens seien. Das führte dann zu einem Vergleiche mit den geognostischen Verhaltnissen der Inseln des malayischen Bogens und der an zeinem Innenrande gelegenen Eilande, wobei namentlich auf die tertiaeren und quartaeren Ablagerungen des letztgenannten Gebietes der Nachdruck gelegt werden musste.

Nun befand ich mich aber im Besitze eines schönen Untersuchungsmateriales, welches von meinem Freunde A. Wichmann auf seiner Reise nach Celebes, Timor und Flores (fast gleichzeitig mit der Wertheim'schen Reise) zusammengebracht worden war, sowie einer prächtigen Suite von

Versteinerungen, die der Bergingenieur C. J. van Schelle im nördlicher Celebes gesammelt hatte. Alle genannten Objekte entstammten tertiaerer und posttertiaeren Ablagerungen und waren bereits so weit für anden Zwecke durchgearbeitet, dass die Gastropoden völlig bestimmt vorlagen aus dem Pliocaen von Timor desgleichen die meisten Zweischaler.

Das Alter der Schichten, aus denen die Versteinerungen stammten liess sich somit bereits beurtheilen, und es schien deswegen wunschens werth, die einschlägigen Untersuchungen der oben bezeichneten Fragestel lung unterzuordnen. Das ist geschehen, und so liegt denn im Folgender eine Arbeit vor, welche das zu Gebote stehende Material zwar keinesweg erschöpfend behandelt, aber jedenfalls nichts Wesentliches übergeht, war zur Beurtheilung der Continentalgrenze bis heute vom geologischen Stand punkte aus verwerthbar ist. Einige Speciesbestimmungen von Versteinerungen und einige Gesteinsbeschreibungen — Beides für den hier verfolgtes Zweck ohne weitere Bedeutung — müssen bei anderer Gelegenheit nach geholt werden.

Dass die Bearbeitung für die verschiedenen Gebiete, welche für den Vergleich mit den Kei-Inseln in Betracht kamen, sehr ungleichartig aus fallen musste, versteht sich von selbst. Denn einerseits wurden verschiedene Sammlungen hier zum ersten Male untersucht, während betreffs anderer Gegenden einfach die Ergebnisse alterer Untersuchungen aus der Literatur zusammengetragen sind; andererseits stösst man bei der Prüfung der Geologie dieser entlegenen Inselwelt überall auf Lucken, die vorläufig noch nicht angefüllt werden können. Immerhin aber dürfte die nachfolgende Zusammenstellung einiges Interesse auch für geographische Kreise beanspruchen und zum weiteren Ausbau der hier erhaltenen Resultate anregen.

Unter allen von GROSS-KEI abkunftigen Handstucken fallen diejenigen am meisten in die Augen, welche durch grossen Reichthum an Orbitoiden ausgezeichnet sind; auch wurde ein Orbitoidenkalk bereits fruher von Gross-Kei bekannt. Das betreffende Gestein wurde durch v. Rosenberg gesammelt und später von mir als Miocaen beschrieben 1); Eine der Nummern aus der Sammlung Rosenberg's (102a) stimmt bis in die kleinsten Einzelheiten mit dem Handstücke 116 der Wertheim'schen Sammlung überein; beide sind auch bei Larat geschlagen. Die Orbitoiden-

¹⁾ Sammlungen des Geolog. Reichs-Museums in Leiden. Serie I, Bd. 1, pag. 72, 73 u. 83-

kulke von Gross-Kei sind aber von sehr wechselndem petrographischem Charakter, wie schon durch Rosenberg's Sammlung angedeutet war und wor allem jetzt sich deutlich zeigt.

Die meisten Orbitoidengesteine sind dichte, feste Kalksteine von splittngem Bruche; einige zeigen ziemlich bedeutenden Thongehalt und andere sind als Mergel zu bezeichnen. Selten sind sie erdig, öfter dagegen wird die Structur durch die zahlreich eingeschlossenen Scheiben der Foraminieren blattrig. Solche blättrige Varietaten sind die bereits erwähnten negelrothen Gesteine von Larat (116) und namentlich auch rothe Kalksteine, welche weiter sudlich auf Gross-Kei, im Gebirge zwischen Tamangl und Waduar, anstehen (123). Die Färbung der Orbitoidenkalke wechselt von Weiss, Grau, Gelb und Lichtbraun zu Gelblichweiss, Gelbroth, Reischroth und Ziegelroth. Sie erinnern dadurch an manche quartaere Riffbildungen, von denen sie aber doch auch petrographisch bereits durch die dichte Structur unterschieden werden können. Die Orbitoiden sind fast stets muhelos schon bei makroskopischer Betrachtung sicher zu constatiren, denn man nimmt die Kammern und Kegelpfeiler leicht wahr. Bisweilen findet man die erwähnten Versteinerungen auch angewittert, and liefern sie dann, namentlich auf Vertikalbruchen, ausserst zierliche and deutliche Bilder. Dass die Orbitoiden im Gesteine von Larat eine ganz auffallende Grösse erreichen, erwähnte ich schon früher. Auch in der Wertheim'schen Sammlung finden sich derartige Individuen vertreten. So führt ein grauer Kalkstein, welcher zwischen Warka und Oherl ansteht (137) Exemplare von mehr als 50 Mm. Länge, ein gelber Kalkstein ans dem Kar-Gebirge (149) solche von 55 Mm. Länge, mit starker, Inopfartiger Verdickung. Ausser den Orbitoiden enthalten die betreffenden Gesteine auch sehr zahlreich Kalkalgen (Lithothamnium), und dass daneben Alveolina vorkommt, wurde früher gleichfalls schon erkannt 1).

Die Fundorte, an denen die Orbitoidenkalke sicher nachgewiesen werden konnten, liegen fast ohne jede Ausnahme auf Gross-Kei; es sind, in der Richtung von Nord nach Süd aufgezählt, die folgenden:

- 1) An der Nordkuste von Gross-Kei, sudlich von Har (151).
- 2) Etwas weiter südlich von Har, ebenfalls an der Küste und nördlich von der Mündung des Kali Besaar (96).
 - 3) An der Mundung des erwähnten Flusschens als Rollstein (97).
- 4) An den Gehängen und auf dem Gipfel des Gebirges Wajeu im Innem des Eilands, östlich von Hör (105).

¹⁾ Martin l. c. pag. 73.

- 5) Ebenfalls im Gebirge Wajeu, aber weiter westlich, Hor genähert (104)
- 6) Im Gebirge Kar, im Innern, zwischen Ad an der West- und Eli au der Ost-Kuste (149 u. 150).
- 7) In einem Bache bei Ad an der Westkuste, als Rollstein (63).
- 8) Am Ostabhange des Gebirges Kar, westlich von Eli (101).
- 9) Im Innern der Insel, sudlich vom Berge Boo, zwischen Kaap Ibr an der West- und Watlar an der Ost-Kuste (147).
- 10) Daselbst, etwas mehr Watlar genähert (146).
- III) Im Gebirge zwischen Warka an der West- und W\u00e4or an der Ost Kuste. Ein wenig sudlich vom schmalsten Theile der Insel, in Innern (113).
- 12) Etwas südlich von dem letztgenannten Fundorte, im Innern (137)
- 13) Oestlich von Larat an der Westkuste, im Adgebirge (115).
- 14) Weiter östlich von Larat, im Innern, die Gehänge und den Gipfei des Adgebirges bildend (116).
- 15) Noch weiter östlich, Waduar genähert, aus einem Bachbette (117).
- 16) Im Adgebirge, auf der Linie zwischen Waduar und Nerong an der Westküste, nördlich von den Fundorten von 116 u. 117 (119 u. 120).
- 17) Im Gebirge zwischen Tamangil an der West- und Waduar an der Ostkuste (121 u. 123).
- 18) Im Gebirge westlich von dem an der Ostküste gelegenen Totrean (135).
- 19) Etwas weiter südlich, im Westen von Kilwat (124).

Nächst den Orbitoidenkalken verdienen besonders Gesteine hervorgehoben zu werden, welche Alveolinen als die vorherrschenden Versteinerungen enthalten. Südlich vom Berge Boo, unweit Keluwair, an der Ostküste von Gross-Kei, fand sich ein blaugrauer, rostbraun verwitternder Kalkstein, welcher Alveolinen in so grosser Zahl enthält, dass die abblätternden Gehäuse dieser Foraminiferen auf Bruchflächen dem Gesteine eine oolithische Structur verleihen. Das Gestein ist zudem reich an fremden Mineralbrocken, und da diese allothigenen Bestandtheile abgerollt, die Alveolinen auch zum Theil zerbrochen sind, so liegt offenbar eine alte Strandbildung vor (139 u. 140). Ein ähnliches Gestein steht etwas weiter östlich, unweit Holat, an (143), trägt hier aber bereits den Charakter eines durch Kalkspath cementirten Sandsteins, in dem die Alveolinen sehr vereinzelt auftreten. (Uebrigens verläuft das Gestein in demselben Handstücke in eine andere, deutlich vom Sandstein geschiedene Schicht von Kalkstein). Ferner liegt mir ein Alveolinenkalk von einem Punkte vor, der nördlich von Waduar an der Ostküste der südlichen Inselhälfte sich

befindet, nicht weit von der Kuste entfernt (118). Es ist wiederum von graublaner Farbung, gelbbraun verwitternd, aber sehr arm an fremden Mineralfragmenten, und auch die Alveolinen sind darin nicht sehr zahlreich. Mikroskopisch liess sich neben anderen Foraminiferen auch Orhitrides nachweisen, sowie wiederum Lithothamnium. Die Gehäuse der Foraminiseren sind auch hier z. Th. zerbrochen. Das Handstuck sieht Alveolinenkalken von Neu-Guinea, welche ich früher beschrieb, zum Verwechseln ahnlich, ganz besonders den Nummern 51 u. 52 der Sammlung Macklot 1), und da die Alveolinenkalke von Gross-Kei zudem palaeontologisch gleichwerthig sind, so stehe ich nicht an, sie für gleichzeitige Bildungen anzusprechen. Aus petrographischen Grunden halte ich es ferner für sehr wahrscheinlich, dass noch eine Reihe von anderen Kalksteinen demselben Schichtencomplexe angehört wie die erwähnten Alveolinenkalke, so besonders ein Kalkstein von Oheil an der Ostkuste (136) und ein anderer von dem kleinen Eilande Nuhujan an der Westküste bei Elat (129); doch werden hierüber die Beobachtungen Wertheims nähere Auskunft geben mussen.

Stellenweise treten in den Kalksteinen des in Rede stehenden Schichtencomplexes Hornsteineinlagerungen auf, so an der Ostküste von Gross-Kei bei Keluwair (141, 142), von woher auch die ersterwähnten Alveolinenkalke abkünftig sind (139, 140). Die Vermuthung lag nahe, dass Radiolarien das Material zur Bildung der Hornsteine möchten geliefert haben; mikroskopisch liess sich indessen hiefür der Beweis nicht beibringen, da weder die Hornstein- noch die angrenzende Kalkstein-Schicht sich genügend auflösten; sicher ist nur, dass in den Hornsteinlagen auch wiederum Orbitoiden in ansehnlicher Menge vorkommen.

Zur Beurtheilung des Lagerungsverhältnisses der Orbitoiden- und Alveolinen-Schichten ist zunächst hervorzuheben, dass die Ersteren im Innern der Insel eine weite Verbreitung besitzen und hier von so zahlreichen Fundorten bekannt sind, dass sie ohne Anstand als die herrschende Formation des Binnenlandes von Gross-Kei bezeichnet werden durfen. An der Nordküste treten sie bei Här bis ans Meer hinan. Die Alveolinenkalke dagegen sind nur in der Nähe der Küste nachgewiesen, und andere Kalksteine, denen die Orbitoiden fehlen, während sie sich petrographisch am ehesten den Alveolinenkalken anreihen lassen, lagern ganz allgemein im äusseren Umkreise der Orbitoiden führenden Gesteine. Letztere bedecken nicht nur die Höhen des Ädgebirges bei Larat, son-

¹⁾ Vgl. Sammlungen l. c., pag. 68 ff.

dern auch die höchsten Gipfel von Gross-Kei, das Gebirge Wajeu uns Kar im Norden. Nur der Berg Boo, dessen Spitze nach Wertheim un zugänglich ist, könnte zum Theil aus einer anderen Formation aufgebau sein, während an seinem Ostabhange wiederum derselbe Orbitoidenkal lagert, wie auf der Spitze des Kar und Wajeu. Dieser Orbitoidenkall nun, welcher identisch ist mit dem von Wertheim als Korallenkalk an geführten Gesteine, erhebt sich an genannten Orten inselartig übe die niedrigeren Berge, welche Letztere auch an der Küste und in der Thalern zu Tage ausgehen 1). Es ist hieraus zu schliessen, dass die Ot bitoiden führenden Gesteine die jungere, die Alveolinen führenden Kalk der Küstenregion die altere von beiden Bildungen repraesentiren. Dafü spricht ausser dem Lagerungsverhältnisse auch noch der Umstand, das die Kalke mit Alveolinen einen von krystallinischen Gesteinen abkuntigen Sand enthalten; denn dieser konnte in sie nur in einer Zeit ein geschwemmt werden, in der die betreffenden Gesteine, welche den Sam lieferten, noch nicht von Kalkbildungen überlagert waren, also sehr waht scheinlich in einer der Entstehung der Orbitoidenkalke vorhergegangene Periode. Endlich deutet auch schon das Aeusere beider Gesteinsreihen an dass diejenigen, welche die Orbitoiden enthalten, die jungeren seien.

Beide hier unterschiedenen Bildungen, die Orbitoiden- und die Alve olinenkalke, gehören indessen dem Tertiaer an, und dieselben Grunde welche mich früher veranlassten, die Alveolinenkalke von Neu-Guinea und die Orbitoidenkalke von Gross-Kei zum Miocaen zu stellen 2), lassen mich auch heute noch diese Altersbestimmung für die gesammten Kalkablage rungen von Gross-Kei als die wahrscheinlich richtige betrachten. Freilich darf nicht verschwiegen werden, dass eine weitere Erhärtung der Richtigkeit dieser Auffassung sehr erwünscht wäre; doch vermag ich eine solche an der Hand des vorliegenden Untersuchungsmateriales nicht zu erbringen, da auffallender Weise ausser den erwähnten Foraminiferen und Kalkalgen überhaupt keine bestimmbaren Versteinerungen in dem ganzen Schichtencomplexe vorzukommen scheinen. Die Wertheim'sche Sammlung enthalt mindestens nichts Derartiges. Vielleicht liegen an der Basis der miocaenen noch ältere, eocaene, Kalksteine.

Die Tertiaerschichten befinden sich nach Wertheim's Mittheilung in fast schwebender Lage, mit einem Fallwinkel von nur 5—15°, und zwar

Vgl. den Bericht von Wertheim in Tijdschr. v. h. Kon. Ned. Aardrijkskundig Genootschap 2e Ser. Deel VI, Afdeeling Verslagen en Aardrijkskundige Mededeelingen 1889, pag. 497.

²⁾ l. c., pag. 82.

fallen sie an der Westküste im Allgemeinen nach West, an der Ostküste nach Ost ein. Nur die schmalsten Theile des Eilands zeigen in dieser Hinsicht andere Verhaltnisse. Das Streichen der Formation folgt der Langsrichtung der Insel.

Quartaere Bildungen sind in der Gesteinssammlung von Gross-Kei gar nicht vertreten, wohl aber von der Kuste der kleinen Insel Nuhujan, welche in unmittelbarer Nahe der Westkuste von Gross-Kei, bei Elat, gelegen ist. Von dort stammt ausser einem groben Korallensande und locker verbundenem, schaumigem Korallenkalke auch eine Anzahl von Mollusken, die z. Th. noch Perlmutterglanz und Farbenreste bewahrt haben. Es sind verschiedene Species von Cypraea, Cardium, Arca, Spondylus 1. 2. w., sämmtlich lebende Arten des benachbarten Meeres (108).

Auf der KLEIN-KEI-GRUPPE spielen, im Gegensatze zu Gross-Kei, quartaere Bildungen eine grosse Rolle. An der Sudküste der Hauptinsel, NUHUTUTUT, stehen am Kaap Doan (im Südwesten) und bei Danar (im Südosten) schaumige Korallenkalke, Korallen-Sande und -Conglomerate am. Sie führen nur Species der heutigen indopacifischen Fauna, und die Korallen sowohl wie die Mollusken, darunter Cypraea, Pterocera, Veneriden, Tridaena, sind zum Theil von ausserordentlich guter Erhaltung und sogar mitunter mit sehr guten Farbenresten versehen. Diese Bildung kann somit nur jungquartaer sein; bemerkenswerth ist indessen, dass unter den Rollsteinen auch grössere Brocken von Orbitoidenkalk vorkommen, ein Beweis, dass die Tertiaerformation in unmittelbarer Nähe anstehen muss.

Als Liegendes des quartaeren, etwa 20 M. machtigen Korallenkalkes von Kaap Doan tritt eine ungefahr 10 M. machtige Foraminiferenbank auf, ein strohgelbes, lockeres, nur an der Basis der Korallenkalke mehr versetigtes Gestein. Es ist sast ausschliesslich aus Globigerinen ausgebaut (Globigerina, Orbulina und Pullenia), untergeordnet aus Rotalinen, und ganz sporadisch scheint auch eine winzige Art von Nummulites vorzultommen; doch waren die Schliffe nicht geeignet, die Bestimmung mit Sicherheit vorzunehmen. Wäre sie unzweiselhast, so könnte dennoch aus dem Austreten von Nummulites ein Beweis für das tertiaere Alter nicht bergeleitet werden, da die Gattung lebend, und unter anderen auch aus australischen Korallenrissen, vorkommt (N. cumingii Carp.) 1). Ich halte die Foraminiserenbank für quartaer, und dürste es am passendsten sein, sie als alteres Quartaer von den das Hangende bildenden Korallenkalken zu trennen. In welcher Tiese die Schicht gebildet ist, lässt sich nicht bestim-

¹⁾ Voyage of H. M. S. Challenger, Zool. IX, pag. 749.

men, da die Globigerinen an der Oberfläche des Meeres leben ¹). In den festeren, unmittelbar an der Basis des Korallenkalkes liegenden Theile des Bank sind die Gehäuse der Foraminiferen vielfach zerbrochen.

Dieselbe Foraminiserenschicht steht weiter landeinwarts, im Nordwester von Lumogoron, an. Sie bildet hier ein perlgraues, sestes Gestein, welches palaeontologisch demjenigen von Kaap Doan durchaus gleichwerthig ist. Die Bedeckung des jungquartaeren Korallenkalkes scheint sich somit auf die unmittelbare Nahe der Küste zu beschränken, während landein warts bald die altquartaeren Bildungen darunter hervorstossen. Zu letzteren ist auch wohl ein sester Kalkstein zu rechnen, welcher weiter nördlich, westlich von Rumat, ansteht. Durchschnitte länglicher, meist in Kalkspath umgewandelter Körper darin gleichen freilich auf den ersten Blick unge mein Orbitoiden; aber in Dünnschlissen bemerkt man bald, dass sie damit nicht in Verband gebracht werden können; zum Theil liessen sie sich auf Kalkalgen zurückführen. Lithothamnium ist neben Korallen- und Foraminiserenresten häusig; das Gestein erscheint löchrig und zellig durch herausgewitterte Petresakte.

Selbstredend ist es kaum möglich, ein sicheres Urtheil über ein Gestein vom Charakter des letzterwähnten Handstückes zu fällen, wenn die Untersuchung nicht durch andere Angaben gestützt wird. Aber es lässt sich doch bei keiner der mir von Nuhututut vorliegenden Gesteinsproben ein Anhalt für die Gegenwart von tertiaeren Bildungen auf dieser Insel finden, so dass dieser allgemeine negative Charakter sicherlich zu Gunsten des Quartaers ausfällt. Schon aus petrographischen Gründen muss ich Kalksteine von Dudumahan (159 u. 160) im Norden, und von Evu, im Westen des Eilands, für quartaere Korallenkalke halten, und auch die Kalksteine, welche den höchsten Punkt von Nuhututut, den Gelanit, bilden, zeigen keinerlei Merkmale, welche ihre Zuziehung zum Tertiaer rechtfertigen würden.

So wenig wie auf Nuhututut sind auch auf der nachst grössten Insel der Klein-Kei-Gruppe, auf NUHUTAWUN, tertiaere Gesteine nachweisbar. Alle Handstucke, welche mir aus der Gegend von Tual vorliegen, gehören unstreitig dem Quartaer an. Es sind poröse Korallenkalke, bisweilen schaumig, und Korallenbreccien, darin Ostrea, Pecten, Arca und Chama, zum Theil mit sehr gut erhaltenen Farbenresten. Solche Bildungen treten nicht nur an der Kuste daselbst auf, sondern setzen auch die Hugel im Westen und Osten von Tual zusammen; sodann sind quartaere Korallen-

¹⁾ l. c., p. 593.

beite noch von Defur, im Norden von Nuhutawun vertreten. Von der bleinen Insel NAI im Westen von Nuhututut enthält die Wertheim'sche Sammlung abermals ein Handstück einer jungen Korallenbildung.

Dass indessen auch auf der Klein-Kei-Gruppe tertiaere Gesteine nicht ganzich sehlen, beweist ausser den bereits erwähnten Brocken von Orbitoidenkalk ses der quartaeren Bildung an der Küste von Nuhututut besonders ein Vorkommen auf dem kleinen Eilande Ut, gegenüber der Nordküste von Nuhutatut. Von hier liegen mir sandige, perlgraue bis lichtbraun gefärbte Kalksteine vor, die neben den oft erwähnten Kalkalgen Orbitoides in grosser Zahl inhren, daneben vereinzelt Alveolina und Globigerina, während endlich noch die Anwesenheit von Cycloclypeus und Amphistegina wahrscheinlich ist. Obwohl einige Gehause der Foraminiferen durch dunkles Erz infiltrirt ind, ist doch der Erhaltungszustand durch weit vorgeschrittene Metamorphose für eine nähere Bestimmung ungunstig, zumal auch die Schalen nelfach zerbrochen sind. Dass aber Orbitoides in grosser Anzahl auftritt, at ohne jeden Zweifel festzustellen, und ebenso lässt sich an der Art der Verkittung der Gehäuse dieser Gattung mit dem groben, beigemengten Sande, sowie an dem Fehlen anhängender, fremder Gesteinsmasse bei den Brocken von Orbitoiden erkennen, dass Letztere hier nicht etwa aus einer alteren Schicht eingeschwemmt sind, sondern (vom eigentlichen Wohnonte der Thiere abgesehen) auf primärer Lagerstätte sich befinden.

Von der TAIANDU-GRUPPE, im Westen der Klein-Kei-Gruppe, konnte nur ein einziges Handstück zur Untersuchung gelangen. Es stammt von Langgiär auf der kleinen Insel TAIANDU und ist wieder ein postertiaerer Korallenkalk.

Desto mehr Interesse beansprucht die Insel KUR, der westlichst gelegenen, gleichnamigen Gruppe der Kei-Inseln angehörig. Von hier ist zunachst eine Reihe von Handstucken vorhanden, welche die Anwesenheit der archaeischen Formationsgruppe auf Kur beweisen. Es befinden sich darunter vor allem typische Glimmerschiefer mit hellem Glimmer, welche in einem Bachbette bei Kilmas, am Westabhange des Gunung Tör, unweit Luk, zu Tage treten, ausserdem im südwestlichen Gebirge des Eilands, bei dem Dorfe Kilsoin. Ein Quarzitschiefer, ebenfalls vom Westabhange des G. Tör abkunftig, ist dadurch bemerkenswerth, dass er im Handstucke eine Faltung mit Wellen von einigen Centimetern Höhe zeigt.

Sodann verdient ein Handstück hervorgehoben zu werden, welches wiederum von Luk im Nordwesten der Insel abkunftig ist. Es ist ein dunkelgraues, porphyrisches Gestein mit Einsprenglingen von Feldspath und, in geringerer Menge, von Augit. Die Feldspathe stellen polysynthetische Zwillinge

dar mit zonalem Aufbau, an dem sich auch die reichlich vorhanden Glassubstanz häufig in sehr augenfälliger Weise betheiligt. Die Zone weisen verschiedene Auslöschungsschiefe auf. Flüssigkeitseinschlüss fehlen. Die Einsprenglinge von Augit, welche licht-grünbraun gefart sind, schwachen Pleochroismus zeigen und in wohl ausgebildeten Krystal len von achtseitigem Querschnitte vorkommen, sind ebenfalls reich au Glasseinschlüssen und enthalten nach dem Orthopinakoid verzwillingt Lamellen. Kleinere Individuen erscheinen als Körner, die Feldspathe ir der Grundmasse in Leistenform. Es liegt somit ein Augit-Andesit von Leider ist das Gestein nicht anstehend gefunden, sondern in Einer de tief niedersetzenden Spalten des Korallenkalkes bei Luk, ungefähr fraund vom Strande entfernt, angetroffen. Es könnte somit aus dem Untergrund abkünftig sein, während sonst keinerlei Anzeichen von dem Auftrete jungeruptiver Gesteine vorliegen.

Quartaere Korallenkalke sind ebenfalls in einer Reihe von Handstucke von der Insel Kur vertreten, und zwar nicht nur aus der westlichen Kuttengegend von Luk und Kilsoin, sondern auch vom G. Tör. Sowohl an Westabhange dieses Berges als auch auf seinem Gipfel stehen die genanntel jungen Bildungen an. Dagegen lassen sich tertiaere Gesteine, deren Von kommen auf Kur mir schon früher bekannt wurde 1), in der Wertheim' schen Sammlung nicht mit Sicherheit nachweisen. Vielleicht ist ein durch reichliches Kalkcement verkitteter Sandstein, welcher in einem Bachbett bei Luk ansteht, hieher zu rechnen; doch liess derselbe weder makro noch mikroskopisch irgend welche organischen Reste erkennen.

Nach Mittheilung obiger, an der Hand der Wertheim'schen Sammlung erhaltener Resultate dürfte es wohl angezeigt sein, zu untersuchen, was aus alteren Schriften über die Kei-Inseln vom geologischen Gesichtspunkt aus Interesse beansprucht. Ich habe zu dem Zwecke die mir bekannte Literatur gründlich durchgesehen und führe sie hier vollständig an, damit bei späteren Arbeiten über die Geologie dieser Eilande ein erneutes Studium nicht wieder erforderlich werde ²). Wo die betreffenden Quellen in

¹⁾ Eine Tertiaerformation von Neu-Guinea und benachbarten Inseln (Sammlgn. G. R. Mus., Ser. I, Bd. 1, pag. 71).

²⁾ I. Over een nieuw uit zee opgerezen eiland in de nabijheid der Key-eilanden (Natuurkundig Tijdschr. v. Ned. Indië, VII, p. 159) 1854.

II. C. Bosscher, Bijdrage tot de kennis v. d. Key-eilanden (Tijdschr. v. Ind. Taal-Land- en Volkenkunde, IV, pag. 23) 1855.

Folgenden citirt sind, geschieht dies der Einfachheit wegen unter Angabe der beigefügten römischen Ziffer. Indessen führe ich nicht jede Mittheilung geologischer Art aus den erwähnten Schriften an, da verschiedene in ihrer Fassung schon den Stempel der völligen Unzuverlässigkeit tragen, so dass sie für eine ernsthafte Discussion kaum in Betracht kommen können. Selbstredend ist das sehr verständlich, da die bezüglichen Ansichten nicht von Geologen ausgesprochen wurden.

Von den Karten war diejenige von A. Langen sowohl nach Wertheim's

- III. J. B. J. van Doren, De Key-Eilanden ten N. W. van de Arroë-Eilanden (Bijingen tot de Taal-, Land- en Volkenkunde van Ned. Indië, Nieuwe Volgracks, VI, 22. 238) 1863.
- IV. J. J. de Hollander, Handleiding bij de beoefening der Land- en Volkenkunde ma Naderlandsch Oost-Indië, pag. 392, ff. 1864.
- V. H. C. van Eijbergen, Verslag eener reis naar de Aroe- en Key-Eilanden in de maad Juny 1862 en April en Mei 1864 (Tijdschr. v. Ind. Taal-, Land- en Volkenlande, XV, pag. 220 en pag. 298) 1866.
- VI. C. B. H. von Rosenberg, Reis naar de Zuid-Ooster-Eilanden, pag. 67 ff. 1867. Ber Inhalt ist im Wesentlichen später vom Verfasser wiederholt in: Der Malayische Archipel, Land und Leute, pag. 345. 1878.
 - VII. Wallace, The Malay Archipelago, Vol. II, pag. 176. The Ké Islands. 1869.
- VIII. P. J. Veth, Geogr. aanteek. betr. de Kei-Eilanden (Tijdschr. v. h. Aardrijksk. Genootsch. II, pag. 92). 1877.
 - IX. Voyage of H. M. S. Challenger, Narrative I, 2, pag. 552 ff. 1885.
 - X. J. G. F. Riedel, De sluik- en kroesharige rassen van Selebes en Papua, pag. 214. 1886.
- XI. C. M. Kan, Onze geogr. kennis der Kei-eilanden (Tijdschr. v. h. Ned. Aardnjksk. Genootsch., Ser. 2. Deel IV, Verslag, en Mededeel, pag. 588), 1887.
- XII. E. Berminghaus, Verdere berichten over de Kei-eilanden (daselbst, Deel V. 1888.
- IIII. J. A. Portengen, Iets over de doodengrotten en de rotsteekeningen, die op de Eg-cilanden gevonden worden (daselbst, Deel V, pag. 258), 1888.
- XIV. G. Langen, The Key, or Ké, 1slands. (Proceed. Royal Geogr. Society, Vol. X, pag. 764). 1888. (Hierin eine Karte von A. Langen).
- IV. C. J. M. Wertheim, Brief und »Verslag" (Bericht) über seine Thätigkeit auf im Kei-Inseln. (Tijdschr. v. h. Kon. Ned. Aardrijksk. Genootsch., Ser. 2, Deel VI, Venlag, en Mededeel. pag. 86 en 493) 18<9.
- XVI J. Æ. C. A. Timmerman, De vermeerdering der kennis van den aardbol geswende het jaar 1888 (daselbst, pag. 380). Giebt eine Reproduktion der Langen'schen Katte, welche in der R. Soc. veröffentlicht ist (XIV).
- XVII. G. W. W. C. Baron van Hoevell, De Kei-Eilanden (Tijdschr. v. Ind. Taal-Land- en Volkenkunde, Deel XXXIII, Aflev. 2, pag. 102). 1889.
- XVIII. G. Langen, Ein Eckchen in Niederländisch-Indien (Ausland 1890, N°. 1, 198, 17). Im Wesentlichen ein Auszug aus N°. XIV.

Angabe als auch nach anderen zuverlässigen Berichten (vgl. XI, pag. 55 u. 596) bis vor kurzem die beste. Sie diente dann weiterhin als Basis fi Hoevell, der sie verbesserte und anfullte, besonders betreffs der Schreibweit der Namen, der Lage verschiedener Orte und Länge- und Breite-Bestin mungen (XVII, pag. 103). Der orographische Theil ist aber ziemlic stiefmutterlich dabei behandelt, und hiefur sind Riedel (X) und Lange unstreitig weit brauchbarer. Soweit es möglich war, hielt ich mich rück sichtlich der Schreibweise der Namen an die Angaben von Hoevell.

Nach allen vorliegenden Berichten trägt Gross-Kei, oder Nuhujut, eine durchaus gebirgigten Charakter; seine Höhen steigen bis zu 2000 un 3000 Fuss an, nach Angabe G. Langen's (XIV, pag. 765), und auch Ho vell verzeichnet einige Gipfel von 2000 und 2500 Fuss Höhe (XVII). D die Challenger-Expedition für den Gipfel eines Berges im aussersten Norde 2000' Seehöhe fand, während die übrigen Spitzen noch von Wolken bedeck waren (IX, pag. 554), so dürste die Langen'sche und Hoevell'sche Scha zung der Wahrheit jedenfalls sehr nahe kommen. Wallace giebt sog 3000-4000' Höhe an (VII, pag. 194), während de Hollander den Werthe von Langen wiederum sehr nahe kommt, da er "ungefahr 2500' Höhe angiebt (IV, pag. 392). Dem gegenüber dürfen die Schätzungen von Rie del auf 400-500 M. (X, pag. 215), von Kan auf 500-2000 Fuss (XI pag. 591) und von Berminghaus auf 1200 Fuss (XII, pag. 255) als zu nie drig betrachtet werden. Die höchsten Höhen liegen in der nördlichen Halft des Eilands, und zwar in der Richtung der Längsachse angeordnet, wo gegen sich Gross-Kei nach Suden zu verflacht (XII, pag. 255).

Wie bereits Bosscher (II, pag. 23) und von Rosenberg (IV, pag. 67 betonten, hebt sich die Kuste von Gross-Kei steil aus dem Oceane em por. Die aufeinander gethurmten Felsen riefen Letzterem Timor in die Erinnerung zurück, als er zuerst die Südspitze zu Gesicht bekam, und wie spätere Untersuchungen gelehrt haben, mit Recht; denn die Küster von Timor sind zum Theil aus der gleichen Formation aufgebaut. Flaches Land zeigte sich nirgends.

Die Obersläche der tertiaeren Kalke muss nach den Mittheilungen von Wallace (VII, pag. 182) mit karrenseldähnlichen Bildungen versehen sein wie sie so hausig auf tropischen Kalkbanken gefunden werden; denn die zerrissenen, zelligen Felsen machten es ihm unmöglich, die Formation zu begehen, als er von Här aus landeinwarts dringen wollte. Der rothe Thon den derselbe Autor sowie Hoevell (XVII, pag. 118) erwähnt, lässt auf die An wesenheit einer lateritähnlichen Bildung schliessen; das anstehende Gebirg wird von Wallace ohne jede Ausnahme als Korallenkalk bezeichnet (pag. 183)

Riedel giebt dann an, dass Gross-Kei ganz aus einer miocaenen Formation aufgebaut sei (X, pag. 214), stutzt sich dabei aber wohl bezuglich der Altersbestimmung des Gebirges lediglich auf meine bereits 5 Jahre sther gemachte Bestimmung der Orbitoidenkalke von Larat; 1) denn Riedel giebt selbst keine Grunde für die Bezeichnung als Miocaen an und Let auch sonst nicht die Gewohnheit, die Quellen für seine geologischen Mittheilungen zu nennen. 2) Jedenfalls wird man aber in seiner Angabe one Bestatigung dessen sehen durfen, was auch Wallace sagte, und was fener die Untersuchung des Wertheim'schen Materiales gelehrt hat, dass mich der geognostische Bau von Gross-Kei ein sehr gleichförmiger ist. 3) An der Kuste von Gross-Kei kominen bei Elat nach van Doren viele the und Banke vor (III, pag. 251), und solchen müssen auch die oben wähnten, quartaeren Bildungen von der Kuste der Insel Nuhujan (aut Karte von Hoevell steht [an] gegenüber Elat entnommen sein. Auch m Rosenberg erwähnt die Riffe von der Sudwestseite des Eilands (VI, eg. 68), und nach der kartographischen Darstellung von A. Langen (XIV) saumen sie Gross-Kei vollstandig (??)

Spielen diese jungen Riffbildungen bei Gross-Kei eine untergeordnete Rolle, so betheiligen sie sich sehr wesentlich an dem Aufbau der niedrigen Inseln im Westen dieses Eilands, von Klein-Kei (Nuhuroa) 4). Schon van Kleiner erwähnte dies (V, pag. 359), und nach Riedel bestehen die beteffenden Eilande lediglich aus einer jungeren Korallenbildung 5) (X, pag. 215). Auch G. Langen führt Korallenkalk als die herrschende Formation daselbst an, worin nur hie und da Kieselgesteine angetroffen werden (XIV, pag. 765 und 768), und sicherlich ist es richtig, dass Gross-Kei viel Inter sei als Klein-Kei, wie derselbe Autor hervorhebt, wenngleich seine Angabe, Gross-Kei sei hauptsachlich aus vulkanischen Gebilden aufgebaut, sach Obigem wohl keiner Widerlegung mehr bedarf.

Auch verlegt G. Langen die Entstehung von Klein-Kei, worunter von ihm aber nur Nuhututut verstanden wird, in eine viel zu junge Zeit, wenn er sagt, dass es vor 35 Jahren bei einem Erdbeben aus dem Oceane emporgestiegen sei (XIV, pag. 765 und XVIII). Die Langen'sche Angabe ist auf ein handgreifliches Missverstandniss zurückzuführen. In der That sind millich ungefahr in der durch Langen angegebenen Zeit ein paar kleine

¹⁾ Vgl. oben pag. 244.

²⁾ Vgl. auch Sammign. des Geol. Reichs-Museums, Ser. I, Bd IV, pag. 78.

³⁾ Eine Abbildung der Küste von Larat findet sich bei Rosenberg (VI, pag. 68).

⁴⁾ Die ganze Gruppe, im Sinne von Hoevell, ist gemeint.

Dasselbe wird auch von Kur gesagt, ist hier aber ohne Zweifel falsch (sieh oben).

Eilande in der Nähe des damals schon lange bestehenden Nuhututz emporgehoben, und Langen hat hieruber einen Bericht erhalten, be dem irrthumlich die Bildung der kleinen Eilande auf Klein-Kei (Nuht tutut) übertragen wurde. Vice-Admiral van der Plaat hat am 15 Mei 185 die neu entstandenen Inseln besucht, so dass ihre Bildung vermuthlich is den Anfang desselben Jahres fällt. Genaueres ist aus dem Berichte nick zu ersehen (I). Eine der erwähnten Inseln befand sich bei Ut, also nöre lich von Nuhututut, und hatte 250 Ellen Durchmesser; man fand darat "Eisenerz und Brocken von eisenhaltigem Manganerze". Ein zweites gleichzeitig entstandenes Eiland wurde nicht besucht, und nach Bericht ten der Eingeborenen sollte noch ein drittes erhoben sein, das aber späte wieder verschwand.

Ueber altere, durch STRANDLINIEN angezeigte Hebungen der Inselliegt eine Reihe von Mittheilungen vor. Nach A. Langen (XI, pag. 588 befinden sich solche in verschiedenen, etwa tausend Meter langen Reihe über einander, in Gestalt von Höhlen, welche mit Tropfsteinen bekleicht sind. Dass es echte Strandlinien sind, geht aus der Langen'schen Zeich nung, die ich selbst Gelegenheit hatte zu sehen, sicher hervor. Der Punk ist an der Nordküste von Nuhututut gelegen, und beträgt die Anzahl de Strandlinien daselbst laut Brand (XI, pag. 596) fünf. Auch Hoevell gieb die Anzahl auf 4-5 an (XVII, pag. 110 und 146), Berminghaus auf z bei Dudumahan, gegenüber Ut. (XII, pag. 256). Zum Theil sind die Grotten in diesen alten Strandlinien als Begräbnisstätten benutzt worden, und bei Kulsir befindet sich eine solche eine halbe Stunde Gehens von de jetzigen Küste entfernt (XIII, pag. 258).

Zwischen Dudumahan und Ohidair sind an den Felsen, welche die früheren Uferlinien aufweisen, an unnahbaren Stellen ZEICHNUNGEN angebracht, mit denen Portengen sich beschäftigte (XIII) und die auch Hoevell bespricht (XVII, pag. 146). Portengen drückt seine Verwunderung darüber aus, dass Jemand es gewagt habe, an solcher Stelle am lothrecht abstürzenden Felsen die Zeichnungen anzubringen (pag. 260); nach Meinung der Eingeborenen seien sie durch Geisterhände verfertigt. Auch G. Langen spricht davon und schildert den Aberglauben der Eingeborenen, welcher sich nach Anlass der Zeichnungen an jene Felsen knüpfe, während er selbst es als ein Wunder bezeichnet, dass überhaupt ein Mensch im Stande gewesen, diese Figuren daselbst zu malen (XIII, pag. 778). Und doch ist die Erklärung ausserordentlich einfach:

Die Zeichnungen liegen, wie erwähnt, im Gebiete der alten Strandlinien, und zwar in der obersten derselben (XVII, pag. 146). Sie befinden

sich ferner hauptsächlich unter überhängenden Felsen (XIII, pag. 259 u. XVII l. c.). Portengen meint, dass diese Stellen gewählt seien, um die Darstellungen gegen Wind und Regen zu schützen; mir ist es aber gar nicht zweiselhast, dass die Zeichnungen sich ursprunglich in Höhlen und war in Todtengrotten befunden haben, welche nach dem Meere zu abgesturzt sind, so dass nur ein Theil der Decke hangen blieb und die Zeichungen dem Tageslichte zugänglich wurden. Die Analogie mit den westindischen Grotten, die ich selbst zu sehen Gelegenheit hatte, ist eine ngemein grosse, und der Absturz nach der Seeseite erklärt sich ohne jegliche Schwierigkeit. Ist es doch eine bekannte Thatsache, dass Koralintalke oft von tiefgehenden, vertikalen Spalten durchsetzt werden, so dass ine Loslosung bedeutender Felsmassen oft ohne besonders wahrnehmbare ssere Anlässe erfolgt. Hier auf den Kei-Inseln kann aber der Abbruch Schichten noch durch die zu Zeiten vorkommenden Erdbeben bedert worden sein (vgl. XIV, pag. 765). Die Annahme, dass die mit sichnungen versehenen Felspartien zur Zeit der Anfertigung jener rohen Imstleistungen bedeutend niedriger sollten gelegen haben und erst später n die ansehnliche Höhe hinaufgerückt wären, ist geologisch durchaus therflussig.

Aus der nachweislich stattgefundenen Erhebung von Klein-Kei haben Llangen (XI, pag. 588), Berminghaus (XII, pag. 256) und Hoevell (XVII, 🕦 110) geschlossen, dass hier vulkanische Erscheinungen zu Grunde Igen, offenbar aus Unbekanntheit mit tektonischen Verschiebungen in der Erdkruste. Auch durste sich die Angabe von G. Langen und Hoevell, tass bei Dula ein erloschener Krater vorkomme 1) (XIV, pag. 765; XVII, Pg. 110) auf ähnliche Irrthumer zurückführen lassen, um so mehr als talsche Auffassung Langen's von dem vulkanischen Ursprunge von Gross-Kei aus Obigem deutlich erhellte. Wertheim bemerkt zudem, dass r die Meere bei Dula (worunter sich auch der angebliche alte Krater beinden durste, da er nach Langen und Hoevell mit Wasser gestullt ist) besicht habe, und sagt ausdrucklich, dass er nirgends eine andere Formation als Korallenkalk angetroffen (XV, pag. 87). Die Vermuthung des Letzteren, dass diese Bildungen im Innern von Klein-Kei vielleicht miocaenen Alters sein möchten, liess sich freilich an der Hand seiner Sammlang nicht bestätigen.

¹⁾ Derselbe ist auch auf der Karte Langen's verzeichnet. Der Ort Dula (Kei-Dula) is in dem Werke der Challenger-Expedition in zwei Photographieen dargestellt (pag. 33 und 556).

Entsprechend dem jugendlichen Alter seiner Korallenkalke besitt Klein-Kei nur eine unbedeutende Höhe; aber da es mit Waldern vor mindestens 100 Fuss Höhe bedeckt ist, so scheint es höher emporzuste gen als in Wirklichkeit der Fall ist (IX, pag. 554). Nach G. Langen be sitzen die bedeutendsten Erhebungen von Klein-Kei eine Höhe von 20 Fuss (XIV, pag. 765), während sie nach Hoevell (XVII, pag. 110) nirgend höher als 100 Fuss sind, mit alleiniger Ausnahme des auf 250 Fuss ge schätzten Gelanit. Nach A. Langen beträgt die mittlere Höhe sogar nu 15 Fuss, während der Gelanit bis zu 300 Fuss ansteigt (XI, pag. 591). Berminghaus giebt wiederum 200 Fuss für denselben Berg an und sagt dass auch sonst Höhen bis zu 100 Fuss vorkommen (XII, pag. 256). Je denfalls fehlt es aber an Gegenden mit gebirgigtem Charakter auf Klein-Ke durchaus, wie alle diese Mittheilungen beweisen.

Fassen wir die sammtlichen Einzelbeobachtungen zusammen, welch über die Kei-Inseln im engeren Sinne vorliegen, so gelangen wir zu folgendem Ergebnisse:

Auf der Hauptinsel, GROSS-KEI, wird die Obersläche von tertiaerer Kalken gebildet, welche über 2000' ansteigen und, ausgenommen viel leicht den Berg Boo 2), alle Gipsel bedecken. Sie repraesentiren in ihren obersten Lagen miocaene Orbitoidenkalke, in ihren unteren Kalksteine welche Alveolinen sühren und an ihrer Basis entweder als alteres Miocaes oder als Eocaen zu bezeichnen sind. Die Formation ragt an den Kusten steil aus dem Meere hervor und ist oberslächlich zerklüstet und zerrissen zum Theil ist sie aequivalent mit tertiaeren Kalksteinen von Timor und Neu-Guinea, und in ihrem Umkreise treten jungste Riffbildungen lang der Kustenlinie aus.

Der als KLEIN-KEI zusammengefasste Archipel im Westen von Gross Kei ist fast ganz aus quartaeren Korallenkalken, Muschel- und Foramini ferenbanken aufgebaut, unter denen nur hie und da altere Bildungen hervorzustossen scheinen. Unter Letzteren sind tertiaere, vermuthlich mio

¹⁾ So auch auf der Karte, welche der Abhandlung von G. Langen beigegeben ist, so dass der Text des Letzteren hiemit nicht einmal übereinstimmt; umgekehrt fehlt der Name Gelanit auf der Karte. Es ist der Gipfel im N.O. von Klein-Kei gemeint. Sieh auch die Karte von Hoevell.

²⁾ Es ist ein Gipfel im Süden von Wajeu gemeint (vgl. die Karte von Riedel) und nicht der Berg Boo, den Hoevell ganz im Norden, nordöstlich von Hör verzeichnes. Letzterer ist identisch mit dem Berge, den die Riedel'sche Karte Woho nennt.

caene Orbitoidenschichten von Ut bemerkenswerth. Die Quartaerformation ist in altere, landeinwarts gelegene, und jungere, an der Kuste auftretende Bildungen zu trennen. Eine Reihe von gehobenen Strandlinien deutet die bis in historische Zeiten hineinreichende, allmählige Trockenlegung der niedriegen Eilande an.

Die Machtigkeit des Tertiaers von Gross-Kei ist nach Wertheim (XV, pag. 498) sehr bedeutend; doch ist kaum anzunehmen, dass das ganze Eiland aus ihm aufgebaut werde. Schon die Gegenwart von Sand krystallinischer Felsarten in einem Theile der Tertiaergesteine macht dies böchst unwahrscheinlich, ebenso die Wasservertheilung. Denn während der Regen in dem zerklüfteten Kalksteine rasch wegsinkt, sind doch Bache in grösserer Zahl vorhanden, so besonders im Norden der Insel, and es edürfte hier die wasserführende Schicht an der Grenze des Kalksteinges gegen die alteren Formationen sich befinden. Der Berg Boo wird rohl am ehesten weiteren Aufschluss über den geologischen Bau des Eilands geben können und namentlich auch das Bett des Flüsschens, welches südlich von Här ins Meer mündet, so dass dieser Gegend bei späteren Untersuchungen vor allem die Aufmerksamkeit zuzuwenden ist.

Auf Klein-Kei ist die Gegenwart alterer Bildungen schon durch die erwähnten Kieselgesteine angedeutet 1), und vielleicht sind es auch solche Felsarten, welche hier das Wasser am weiteren Durchgange in die Tiese werhindern. Der Wassersall bei Evu, an der Ostküste der schmalen, ties in Klein-Kei eingreisenden Bucht, wird von G. Langen und Hoevell sogar mit einem Bassin in Verbindung gebracht, welches möglicherweise unter Gross-Kei oder gar unter Neu-Guinea gelegen sei (XIV, pag. 768 u. 769; XVII, pag. 111), da er nie versiegt. Die Annahme erinnert mich lebhast an diejenige, welche man in Curaçao für die dort stetig sliessende Quelle bei Hato machte, indem man sie von Venezuela herzuleiten geneigt war. Die wahre Erklärung dürste aber für beide Eilande die gleiche sein, die Mamlich, dass das Wasser vom porösen, quartaeren Korallenkalke wie von einem Schwamme ausgesogen und sestgehalten wird, um an der Grenze des unterlagernden Gesteins sich zu stauen und an geeignetem Orte langsam abzussiesen.

Ueber die Beschaffenheit der KUR-GRUPPE sind die vorliegenden

¹⁾ Welcher Werth der Angabe Hoevell's von dem Vorkommen von Granit und Sandstein auf Klein-Kei beizulegen ist (l. c. pag. 110), lässt sich leider nicht beurtheilen; dem seine Mittheilung, dass bei Eli und Elat die herrschenden Gesteine ebenfalls Granit und Sandstein seien (l. c. pag. 111), ist ohne jeden Zweifel falsch, wie ich aus der Wertheim'schen Sammlung sehe.

Berichte leider weit luckenhafter als über die eigentlichen Kei-Inseln. Rosenberg, welcher das Eiland als die Nordgrenze der Landfauna der Kei-Gruppe betrachtete, schildert es als ganz gebirgig. Er schätzt seine hochsten Gipfel auf ± 1000 Fuss und giebt an, dass dieselben hauptsächlich aus Muschel- und Korallenkalk (unter Ersterem ist nicht Trias zu verstehen) aufgebaut seien. Die Kusten fallen an manchen Orten steil in die See ab und ein breites Korallenriff umsäumt dieselben. Derselbe Autor giebt auch eine Ansicht von einem Theile von Kur, und im Vordergrunde daselbst bemerkt man einen, nach der Beschreibung ungefähr 20 Fuss hohen Felsen, auf dem der sogenannte Compagniestein steht (VI, pag. 85 u. 86) Von demselben Felsen ist das oben bereits erwähnte Tertiaergestein, ein Orbitoiden führender Kalkstein, genommen.

Hoevell schatzte die Höhen von Kur auf nicht viel mehr als 700 Fuss. Er rühmt die Fruchtbarkeit des Bodens und, wie auch Rosenberg, den uppigen Pflanzenwuchs daselbst, theilt aber sonst nichts über das Relief und den geognostischen Bau des Eilands mit. Dagegen wird von Kaimer, der kleinen Insel im Norden von Kur und zu derselben Gruppe gehörig, bemerkt, dass es aus schlecht bewachsenen Kalkfelsen bestehe (XVII, pag. 152—155). Andere Quellen über Kur liegen nicht vor.

Alles, was sich über den geognostischen Aufbau der Kur-Gruppe aussagen lässt, ist demnach Folgendes: Das archaeische Grundgebirge ist an zwei Punkten der Haupt-Insel nachgewiesen, unter anderem auch als Liegendes der Quartaerformation am G. Ter. Der Gipfel dieses, nach Wertheim ± 170 M. hohen Berges wird ebenfalls noch vom Quartaer eingenommen, und letztere Formation hat eine weite Verbreitung; doch kommen daneben auch tertiaere Orbitoidenkalke vor, und endlich ist im Nordwesten der Insel bei Luk das Vorkommen jungeruptiver Bildungen angedeutet. Das Alter der Kalkfelsen von Kaimer lässt sich zur Zeit noch nicht bestimmen.

Neben dem speciellen Interesse, welches sich an die Erforschung des geologischen Baues der Kei-Inseln knupfte, besitzen dieselben noch eine allgemeinere Bedeutung mit Rucksicht auf die Frage der Grenzlinie des asiatisch-australischen Continentes.

Bereits vor einer Reihe von Jahren nahm ich in einem populären Vortrage 1) Stellung gegen die von geographischer Seite vielfach verwerthete

¹⁾ Wissenschaftl. Aufgaben, welche der geolog. Erforschg. d. Ind. Archipels gestellt sind. — Rede. — Leyden, Brill, 1883.

Grenzlinie von Wallace. Es wurde auf die Bedeutung der Vulkanreihe, welche sich von Sumatra aus bis an die Banda-See ausdehnt, hingewiesen, ferner auf die Einheit des geologischen Baues sowohl der Eilande, denen diese Reihe angehört, als auch der innerhalb des Bogens befindlichen Inseln; gleichzeitig wurde die geognostische Verschiedenheit von Timor hervorgehoben und letztere Insel als vermuthlich dem australischen Continente zugehörig betrachtet. In einer fast gleichzeitig erschienenen Skizze der geognostischen Verhaltnisse des Niederländisch Ost-Indischen Archipels!) ist diese Ansicht in Folgendem zusammengefasst: "Nichts wurde hindern, die Grenzlinie nordwestlich von Timor verlaufen zu lassen..... und in diesem Falle wurde mindestens eine Trennung geognostisch verschiedener Gebiete erreicht." Heute lässt sich die hier entwickelte Anschauung weit fester begründen.

Suess stimmte ihr zunächst zu ²) und verfolgte mit bewährtem Scharfsinn den malayischen Bogen, besonders auf Grund der Angaben Riedels, bis zur Umrandung der Banda-See, also bis in die Nähe von Neu-Guinea³). Der vulkanische Zug von Roma bis Tjoor wird mit dem vulkanischen Bogen an der Innenseite der kleinen Antillen verglichen. Die ausserhalb desselben gelegenen "tertiaeren Inseln und die jungen Kalkplatten entsprechen dann dem dort vorliegenden äusseren Bogen. Die Banda-See wurde daher die Stelle des Caraibischen Meeres und die Harafura-See, auf dem Vorlande liegend, jene des Mexikanischen Golfes oder des benachbarten Theiles des Atlantischen Oceanes einnehmen". ⁴)

Wichmann ⁵) vermochte diesen Vergleich weiter auszuführen und legte in einer lehrreichen Uebersicht dar, dass die innere Vulkanreihe von Roma aus sich über Dammer bis Banda ausdehne, während Tjoor einer zweiten Zone angehöre, die sich von Kisser aus über Moa, Letti, Lakor, Babber, Seera, die Südoster Inseln, Kur und die Watubella-Inseln nach Ceram und Buru verfolgen lasse. "Diese Zone setzt sich vorherrschend aus krystallinischen Schiefern und alteren Massengesteinen, die von tertiaeren Kalken umgeben sind, zusammen." ⁶) Dass sie noch dem früheren asiatischen

¹⁾ Die wichtigsten Daten uns. geolog. Kenntn. vom Niederl. O.-Ind. Archipel. (Bijtagen tot de Taal-, Land- en Volkenkunde van Nederl. Indië, 1883, uitg. ter geleg. v. b. VI^e Intern. Congres d. Oriental. te Leiden, pag. 27).

²⁾ Das Antiitz der Erde I, pag. 587 u. II, pag. 207.

³⁾ l. c. II, pag. 208 ff. 4) l. c. II, pag. 209.

⁵⁾ Gesteine von der Insel Kisser (Sammlungen d. geolog. R.-Mus. in Leiden, Ser. I, 34. 2, pag. 183).

⁶⁾ L. c. pag. 201.

Festlande zugezählt werden musse, ist Wichmann nicht zweiselhaft. Ich kann den Ausführungen des Autors noch hinzusugen, dass auch auf Amboina ein granitisches Grundgebirge und Serpentin austritt, welcher letztere von einer tertiaeren oder posttertiaeren Kalksteinbildung bedeckt wird 1).

In diesem Bogen, welcher also der Cordillere oder der mittleren Zone der Antillen entspricht, treten nur ausnahmsweise vulkanische Heerde auf, wie an der Ostkuste von Moa, auf Tjoor und vielleicht auch auf Manawoka. Ein dritter ausserer Bogen wird im Sinne von Suess auch durch Wichmann angedeutet; doch lagen keine genügenden Materialien zur sicheren Beurtheilung der Frage vor.

Es zeigt sich nun sofort, dass Kur in die Inselreihe Ceram-Kisser zwanglos eingereiht werden kann; denn auch auf diesem Eilande begegnen wir wiederum dem Grundgebirge, während die Gegenwart des Andesits durch das Vorkommen eines Vulkans auf der in unmittelbarer Nachbarschaft liegenden Insel Tjoor sehr erklärlich erscheint. Man könnte indessen geneigt sein, in den jungeren Eruptionsprodukten der als mittlere Zone gedeuteten Inselreihe einen Gegenbeweis für die behauptete Analogie mit den Antillen zu sehen. Der Einwand ist aber hinfallig, da auch in der mittleren Suess'schen Zone der Antillen jungeruptive Bildungen auftreten, nämlich auf Antigua. 2) Zwar hat Molengraaff darauf hingewiesen, dass die Fortsetzung der Cordillere der Antillen weder auf Antigua noch auch auf Grande-Terre im östlichen Guadeloupe bisher erwiesen sei; 3) aber es ist doch wohl keinem Zweifel unterworfen, dass dieselbe auf Barbados wiederum zu Tage tritt. Die petrographische Beschreibung, welche Schomburgk von den steil aufgerichteten und gefalteten Schichten seiner "Scotland Formation" giebt 4), erinnert zum Theil so ungemein an den Charakter der westindischen Kreideformation, dass die Annahme der Existenz derselben auf Barbados sehr viel Wahrscheinlichkeit besitzt; jedenfalls mussen aber unter der Scotlandformation vortertiaere Sedimente sich

¹⁾ Martin, Neue Fundpunkte von Tertiaergesteinen (l. c. Bd I, pag. 157).

²⁾ J. C. Purves, Esqu. géolog. de l'île d'Antigoa (Bull. Mus. Roy. d'Hist. Nat. de Belgique, Tome III, 1884—1885, pag. 273.

³⁾ De geologie van het eiland St. Eustatius, Leiden 1886, Brill, pag. 60. — Verfasset theilte mir mit, dass während des Druckes sich einige sinnstörende Unrichtigkeiten in die betreffende Abhandlung eingeschlichen, durch Verwechslung von Barbuda und Barbados. Ich gebe hier die vom Autor herrührenden Correcturen; Auf pag. 59, 4te Zeile von unten lies Barbados statt Berbuda; auf pag. 60, 12te Zeile von oben liess Barbuda statt Barbados; daselbst Zeile 14 von oben ist Barbuda zu streichen.

⁴⁾ The history of Barbados. London 1848, pag. 546 ff.

besinden, und mehr verlangt die Hypothese von Suess nicht. 1) Möglicherweise sind in der mittleren Zone der Umrandung der Banda-See sorohl wie des Caraibischen Meeres die jungeren Eruptivgesteine auf ratialen, zum Senkungsselde niedersetzenden Sprungen hervorgedrungen. Selbstredend sind aber die Suess'schen Zonen nur als schematischer Austruck einer gewissermassen organischen Gliederung aufzusassen, und es at nicht zu erwarten, dass die Trennung jener überall eine scharse sei, sorenig wie es ein Ersorderniss der Theorie ist, dass sich die Bögen überall umschliessen.

Die Kei-Inseln im engeren Sinne, und besonders Gross-Kei, nehmen inlessen eine ganz gesonderte Stellung gegenüber Kur ein, und Gross-Kei
ann überhaupt nicht mehr dem asiatischen Continente zugerechnet weren, wie sich aus folgender Betrachtung über einige geognostische Veraltnisse der Malayischen Mulde ergiebt. Unter dieser Mulde ist der manyische Bogen von Sumatra bis zur geschilderten Umrandung der Bandaee, mit Ausschluss von Sumba und Timor, verstanden, sowie die inerhalb des Bogens gelegenen Eilande, besonders auch Borneo und
kelebes, ohne dass ihre Abgrenzung nach Norden hin bis jetzt mit Siherheit vorgenommen werden könnte. 2)

Seit der Ablagerung des Kohlenkalks auf Sumatra wurden die Inseln der Malayischen Mulde, so weit unsere Kenntnisse reichen, erst in der REIDEPERIODE wiederum vom Meere bedeckt. Ablagerungen, welche em Arrialoor-Stockwerke Vorder-Indiens und somit dem oberen Quader equivalent sind, wurden von Martapura im südöstlichen Borneo bekannt 3), ind obercretacetsche Bildungen haben auch im westlichen Theile dieser nsel eine weitere Verbreitung. 4) Da ferner die sogenannten "alten Schien" derselben Gegend sich als mesozoische Schichten ausgewiesen haben

¹⁾ In einer späteren Abhandlung neigt sich Molengraaff auch mehr der Aussassung on Suess zu. (Het geologisch verband tusschen de West-Indische Eilanden. — Handeingen v. h. Eerste Ned. Natuur- en Geneeskundig Congres. Haarlem 1888, pag. 287 ff.; gl. besonders pag. 296 daselbst.

²⁾ Bei der folgenden Darstellung ist nicht jede einzelne Literaturquelle angegeben, af die ich mich stütze, da die Uebersicht sonst viel breiter hätte gegeben werden müsta, als an diesem Orte beabsichtigt wird. Die hauptsächlichsten Quellen bis zum Jahre 3 finden sich näher angegeben in der oben citirten Abhandlung: "Die wichtigsten laten a. s. w." Nur wo Aenderungen und Zusätze zu dieser älteren Uebersicht erforstlich waren, führe ich die einschlägige Literatur hier sum Theil an.

³⁾ Martin, Die Fauna der Kreidef. v. Martapura (Samml., Ser. I, Bd. 4, pag. 126).

⁴⁾ Martin, Untersuchungen über den Bau von Orbitolina v. Borneo (das. p. 209).

und allem Anscheine nach ebenfalls der Kreideperiode angehören ¹), petrographisch gleiche Bildungen aber auch an anderen Orten, namentlich auch auf Sumatra, auftreten, so scheint es, als ob die Kreideformation innerhalb des in Rede stehenden Gebietes eine grosse Ausdehnung besitze.

Im Beginne der TERTIAERPERIODE waren ebenfalls betrachtliche Strecken vom Meere bedeckt. Auf Sumatra, Java und Borneo scheinen eocaene Schichten eine bedeutende Entwicklung zu besitzen; doch sind sie vielfach von jungeren Tertiaerablagerungen verhullt worden, wie namentlich Tiefbohrungen²) auf Java gelehrt haben, und ihre Abgrenzung lasst sich weder gegen die Kreide noch auch gegen die Miocaenformation überall mit genügender Klarheit erkennen. Sehen wir von den Schichten ab, welche Verbeek noch zum Eocaen, ich selber zum alteren Miocaen zu rechnen pflege, so begegnen wir Sedimenten von unbestritten miocaenem Alter besonders auf Java in sehr mächtiger Entwicklung. Sie streichen von hier nach Madura hinuber, sind auch auf Sumatra, sowohl im Padangschen Hochlande als in Sud-Sumatra, nachgewiesen, ferner auf Nias und in Menado auf Celebes. Auch pliocaene Bildungen nehmen einen wesentlichen Antheil an dem Aufbaue von Java 3); wir begegnen ihnen ferner auf Nias und vermuthlich auf den gleichfalls westlich von Sumatra gelegenen Batu-Inseln. Neuerdings sind pliocaene Ablagerungen zudem von Menado auf Celebes bekannt geworden, und haben sich dieselben als aequivalent mit dem Pliocaen von Fialarang auf Timor erwiesen. 4)

Wenden wir uns den POSTTERTIAEREN SEDIMENTEN zu, so sehen wir zunächst auf Sumatra den grössten Theil des Eilands von quartaeren Meeresbildungen eingenommen. Sie erstrecken sich von der jetzigen Nordostkuste her bis tief ins Innere hinein, und die Grenze des Padang'schen Hochlandes nach Osten hin fallt ungesähr mit derjenigen der quartaeren Meeresbedeckung zusammen. 5) Auf der Malayischen Halbinsel wiederholen sich die gleichen Verhältnisse, indem quartaere Sedimente sowohl im Westen als im Osten einen breiten Landstrich formen, der sich dem alteren, in der Richtung der Halbinsel streichenden Gebirge bei-

¹⁾ Martin, Verstrgn. der sog. alt. Schieferform. v. West-Borneo (das. pag. 198).

²⁾ Martin, Palaeontolog. Ergebn. von Tiefbohrungen auf Java (das. Bd. III).

³⁾ Vgl. Tiefbohrungen, pag. 367.

⁴⁾ Martin, Ueb. d. Vork. einer Rudisten führenden Kreideformation u.s. w. (Sammlungen, Ser. I, Bd. 4, pag. 119). — Vgl. Näheres im Anhange zu der jetzigen Mittheilung.

⁵⁾ Verbeek, Sumatra's Westkust, pag. 644 und Karte VIII.

derseits vorlagert, und auch in Cambodja greifen quartaere Ablagerungen, on Saigon aus, bis tief ins Innere hinein. Die alten Kustenlinien lassen ich hier bis nördlich vom Bien-ho verfolgen. 1) In der Verlängerung des breichens der malayischen Halbinsel stossen wir auf Banka und Blitong, elche bekanntlich geognostisch nichts Anderes sind als die Fortsetzung on Malaka. Auch auf ihnen besitzen quartaere Bildungen eine weite Verreitung, besonders in Gestalt zinnerzführender Seifen, die an einzelnen nten reich an Resten recenter Meeresorganismen sind. Auf Java begegen wir zunächst einem breiten Streifen posttertiaerer Meeressedimente an er dem malayischen Becken zugekehrten Nordkuste des Eilands; naentlich im Nordwesten erlangten dieselben eine bedeutende Entwicklung, d ihre Machtigkeit ist, wie die Tiefbohrungen bewiesen haben, stelnveise eine sehr bedeutende. Sie umsaumen fast vollständig das Eiland nd greisen überalt längs den Flüssläusen bis weit ins Innere hinein, so mentlich in der östlichen Inselhälfte 2). Guppy kam neuerdings sogar zu m Schlusse: "The upheaval in posttertiary times has been very great, d can only be measured by several thousands of feet" 3). So ist es denn ch verständlich, dass in Surakarta eine grosse Zahl subfossiler Wallfischste gefunden ist, unter denen ein fast vollständiger Schädel von Sebalis Schlegeli Flower und ein riesiges Schulterblatt, vermuthlich von Phytus antiquorum Gray 1). Borneo, welches heutzutage eine wenig geglierte Küstenlinie aufweist, war am Beginne der Quartaerperiode auch noch it tiesen, bis ins Herz der Insel reichenden Buchten versehen. Sie wurden kaum verflossener Zeit mit Sedimenten angefullt, darunter das durch old, Platin und Diamant ausgezeichnete Seifengebirge, und auch diese Sediente sind zum Theil bereits als echte Meeresbildungen erkannt worden 5). of Celebes war das Vorkommen quartaerer Meeresbildungen bis vor Kurnur fur Menado bekannt (Muschel- und Krebs-Breccie), während die ciche Formation an der Westkuste von Halmahera ebenfalls angedeutet

i) Berghaus' Physikal. Atlas N°. 25, II Abtheil., Gewässerk. N°. X.

²⁾ Martin, Tertiaerschichten, Allg. Th., pag. 34; ferner Sammlgn. Bd. 3, pag. 366).

^{.4)} Preliminary note on the geol. struct. of the Sindang-Barang district, on the south of Java (Scottish Geogr. Magaz., 1889, Vol. V, pag. 73).

⁴⁾ Die Objekte befinden sich im Leidener Museum und sind daselbat durch Flower immt worden. Es befinden sich über die Herkunft einige kurze Notizen in «Sammten d. geolog. R.-Museums" (Ser. I, Bd. 4, pag. 25); sonst ist bisher nichts über Gegenstand publicirt.

⁴⁾ Th. Posewitz, Borneo, pag. 254.

war 1); neuerdings theilte mir van Schelle mit, dass an der Kuste von Gorontalo recente Sandsteine vorkommen, welche sich 6-7 M. über das jetzige Meeresniveau erheben; ferner sind unsere Kenntnisse von der erstgenannten Insel durch die Reise von Wichmann und Weber sehr wesentlich erweitert worden, und ist damit gleichzeitig die Bedeutung der Quartaerformation für Celebes erkannt.

Schon durch Wichmann wurde betont, dass die Formationen, welche bei der Durchquerung von SUED-CELEBES in der Höhe von Tempe angetroffen wurden, alle sehr jung seien. 2) Ich war dann durch die gutige Ueberlassung des von Wichmann gesammelten, einschlägigen Materiales in der Lage, die mitgebrachten organischen Reste näher untersuchen zu können, und dabei stellte sich zunächst heraus, dass die Ebene, in der die Seen von Sidenreng und Tempe gelegen sind, noch in allerjungster Zeit vom Oceant bedeckt gewesen ist. Hier kommen recente Meeresconchylien vor, welcht nicht nur als Species 3) durchaus mit den Bewohnern des benachbarten Meeres übereinstimmen, sondern auch durch ihren Erhaltungszustand (die Farben sind zum Theil ganz frisch) den Eindruck machen, als wären sie am Strande aufgelesen. Unter den Schnecken beanspruchen Potamide palustris und Telescopium fuscum ein besonderes Interesse, da sie sich namentlich in Salzsumpfen und in der Nahe der Flussmundungen aufhalten. 4) Sie demonstriren somit die allmählige Trockenlegung und Aussus sung des Meeres, welches noch vor Kurzem das Innere von Celebes bedeckte, ein Ergebniss, welches im Hinblick auf die oben mitgetheilten Thatsachen über die Verbreitung des Quartaers im malayischen Becken um so eher verständlich ist, als die Höhenlage über dem Meere bei Tempe nur etwa 20-30 M. nach gütiger Mittheilung Wichmann's beträgt Die Ablagerung hier im Inneren ist im Wesentlichen gleichaltrig mit den nur wenige Meter über dem Strande gelegenen Meeresbildungen, welcht bei Makassar zwischen Tello und Parangloë und in der Umgegend von Tangka bei Balangnipa anstehen, sowie mit den Korallenkalken von Kad jang am Golfe von Boni (alle in coll. Wichm.). Deswegen liegt auch die Annahme vor der Hand, es möchten die Seen von Sindenreng und Tempe abgeschnittene Meeresreste sein, welche bei Trockenlegung des Landes

¹⁾ Tiefbohrungen, l. c., pag. 363.

²⁾ Brief vom 6. November '88 (Tijdschr. Kon. Ned. Aardr. Gen., 1889, Ser. 2, Deel VI, Verslag. en Mededeel. No. 1-3, pag. 90).

³⁾ Vgl. hierfür und für das Folgende die angehängte Liste über posttertiaere Conchylien von Celebes. (Anhang, 2).

⁴⁾ Adams, The genera of recent mollusca, I, pag. 291.

ihren natürlichen Absluss durch den Fluss von Tjenrana nach der Ostkuste von Sud-Celebes sanden und, unterstutzt durch diese Wasserabsuhr, im Lause der Zeit völlig ausgesüsst wurden. 1)

Es möge hier noch beigefagt werden, dass die Wichmann'sche Sammlung ein Gestein enthält (138), welches von einem Berge im Nordosten von Tempe abkunftig ist und einen Rest von Callianassa Dijki Mart. einschliesst. Diese Art ist aus den jungmiocaenen Schichten von Selatjau anf Java bekannt, aber auch subfossil aus einem Bohrloche von Batavia und ans der für recent angesehenen, bereits citirten Breccie von Menado 2). Die betreffende Ablagerung könnte somit eine altquartaere oder jungtertiaere, in der vormaligen Küstenlinie gelegene Bildung sein. Flussgeschiebe von Pankadjene (199 u. 220 coll. Wichm.) halte ich dagegen für tertiaeren Alters; doch ergab die mikroskopische Untersuchung der betreffenden Kalksteine kider kein befriedigendes Resultat, welches geeignet ware, diese Annahme sicher zu bestätigen. Unter allen Umständen aber ist aus dem oben Mitgetheilten zu folgern, dass quartaere Ablagerungen einen sehr wesentlichen Antheil an dem Aufbaue des sudlichen Celebes nehmen, und die orographischen Verhaltnisse berechtigen dazu, diese Schlussfolgerung von Süd-Celebes auf manche andere Gebiete des Eilands zu übertragen.

Auf Saleyer wurden durch Weber abermals quartaere Korallenkalke angetroffen. Solche Korallenkalke sind in der Sammlung Wichmann's auch von Adanara vertreten, woselbst sie beim gleichnamigen Kampong bis etwa 25 M. Meereshöhe angetroffen wurden, und von Solor liegen abermals dieselben Bildungen vor, hier reich an Balaniden, Echinidenstacheln und Kalkalgen. Am Strande von Solor treten diese Kalke bis etwa 5 M. Höhe auf; aber auch der Hugel hinter Menanga wird durch dieselbe Formation gebildet. Endlich fehlt es nicht an Andeutungen, dass noch auf einer Reihe anderer Eilande der malayischen Mulde die Quartaerformation auftrete, namentlich in Gestalt von Riffkalken; doch ist es nicht möglich, die einschlägigen Berichte so zu sichten, dass eine sichere Scheidung von Quartaer- und Tertiaerformation möglich ware. Um den Boden der Thatuchen nicht zu verlassen, möge deswegen hier von den zweifelhaften Vorkommnissen abgesehen werden.

Ueberblickt man die im Vorstehenden aufgezählten Daten, welche über

¹⁾ Verschiedene andere Seen von Celebes, welche zum Meere abfliessende Flüsse speisen, dürften auf dieselbe Weise entstanden sein. Es ist dies eine für die Insel sehr bemerkenswerthe Eigenthümlichkeit (vgl. Anhang unter N°. 1).

²⁾ Vgl. Sammlungen G. R.-Mus., Ser. I, Bd. 3, pag. 39.

die Verbreitung postcarbonischer Sedimente in der malayischen Mulde vor liegen, so ergiebt sich, dass vom Ende der Kreideperiode ab bis is die Quartaerzeit ausgedehnte Strecken der zu dem betreffenden Gebiete gehörigen Inseln vom Oceane bedeckt waren. Ob seit dem Schlusse de Kreideperiode ein langsamer und stetiger Ruckzug des Meeres statt hatte lässt sich zur Zeit noch nicht überblicken; sicher dagegen ist es, das nicht nur am Ausgange der Tertiaerzeit, sondern auch noch während de ganzen Quartaerperiode, bis hinein in geologisch kaum verstrichene Zeiten, das Meer bedeutende Areale der jetzigen Inselwelt bedeckte. Es hatte somit in jüngst verflossener geologischer Zeit eine beträchtliche Landzunahme im Archipel statt; viele bis dahin isolirte Inseltheile wurden durcht trockengelegte tertiaere und quartaere Sedimente mit einander verbunden

Andererseits aber sind auch frühere Verbindungen gelöst. So beweist das Vorkommen des Elephas indicus in jugendlichen Bildungen von Banka dass diese Insel noch vor Kurzem entweder mit Malaka oder mit Sumatra verbunden gewesen sein muss, und ebenso muss Java zur Zeit der Ablagerung der Siwaliks, also im Pliocaen, noch im direkten Zusammenhange mit dem asiatischen Festlande gestanden haben. Nur auf diese Weise ist es erklärlich, dass die javanischen Siwaliks eine Reihe von Arten aufweisen, welche mit denjenigen von Britisch-Indien völlig übereinstimmen. Auf Borneo wurde Mastodon latidens nachgewiesen; hier gilt also das Gleiche wie für Java.

Judd sprach sogar die Ansicht aus, dass die Bildung der Sundastrasse vielleicht auf geologische Vorgänge zurückgeführt werden müsse, welche mit gewaltigen älteren Eruptionen des vulkanischen Heerdes von Krakatau in direktein Verbande gestanden 1). Vielleicht deuten auch die

¹⁾ The Eruption of Krakatão and Subsequent Phenomena. Report of the Krakatão Committee of the Royal Society 1888; pag. 7—8. — Judd glaubte seine Ansicht später durch alte Ueberlieferungen, welche in dem Pustaka-Radja vorkommen und deren Inhalt ihm durch Dr. Baumgarten mitgetheilt worden, bestätigt zu sehen (Nature, 15 Aug. 1889, vol. XL, pag. 365). Diese sogenannten Ueberlieferungen sind indessen völlig werthlos, denn von meinem Collegen H. Kern, welcher, wie wohl kein Andereria gleichem Maasse, berufen ist, ein derartiges Werk zu beurtheilen, wird mir Folgendes mitgetheilt: "Das berüchtigte Pustaka-Radja ist ein erbärmlicher literarischer Betrug aus unserer Zeit und durch Jemanden verfertigt, welcher mit der mittelalterlichen javanischen Literatur und den officiellen Schenkungsurkunden, Steininschriften u. s. w. gänzlich unbekannt ist. Das Stück über den Berg Kapi findet sich auf Seite 45 des zweiten Theiles. Da dieser Theil in 1885 gedruckt ist, bin ich persönlich durchaus überzeugt, dass das Stück nach der Eruption von Krakatau" fabricirt ist (der Berg Kapi = Krakatau).

ingst aufgefundene Vulkanruine Melabu in West-Borneo¹) und der als inkan erkannte Pik von Bonthain²) die Lage von Sprüngen an, welhe mit der Abgliederung der Eilande in direktem Verbande stehen. In ie weit dabei tektonische Vorgänge und die Meereserosion sich gegentig unterstützt haben mögen, lässt sich noch nicht übersehen; dagegen st sich ohne Einschränkung aus allem bisher Angeführten der Schlussehen: dass die Eilande der malayischen Mulde erst in osttertiaerer Zeit zu ihrer jetzigen Ausdehnung gelangt and somit in ihrer heutigen Gestalt von sehr jugendlichem liter sind.

GROSS-KEI ist dem gegenüber viel alter; seine steil aus dem Oceane fragenden Gebirge gehören einer Tertiaerformation an, welche nicht jünrals Miocaen ist. Orbitoidenkalke bedecken noch die bedeutendsten pfel, und die zahlreichen Handstücke, welche von den verschiedensten ten vorliegen, lassen im Verbande mit Wertheim's Angaben keine ante Annahme zu, als dass das Pliocaen völlig fehle. Nur betreffs des bekannten Berges Boo kann hierüber etwa noch Zweifel bestehen; doch die Annahme, dass hier eine Quartaerformation anstehen könnte, unter en Umständen ausgeschlossen. Dagegen spricht ausser der sehr bedeunden Höhe vor allem auch die Thatsache, dass quartaere Ablagerungen ch auf den niedrigeren Gipfeln nirgends angetroffen werden, während ich bei einem erst jüngst erfolgten Rückzuge des Meeres hier die jundlichen Bildungen unmöglich vermisst werden könnten.

Ein weiterer Gegensatz zwischen den Inseln der malayischen Mulde berseits und Gross-Kei andererseits liegt in dem völlig abweichenden keies-Charakter, den die Tertiaerformation letztgenannter Insel zeigt. Nirnds sind in dem westlichen Inselgebiete so mächtige Tertiaergebilde kannt, welche, wie auf Gross-Kei, fast ausschlieslich aus Foraminiferen de Kalkalgen, vor allem aus gigantischen Orbitoiden und aus Alveolina aufgebaut wären. Die Eintönigkeit der tertiaeren Fauna von Kei ist de ganz auffallende, und die Alveolinenkalke sind überhaupt nicht auf in Inseln der malayischen Mulde bekannt. Wohl aber finden sich solche alkbanke mit Alveolinen an der Küste von Neu-Guinea und auf der

¹⁾ Van Schelle, De vulk. Melaboe in de Westerafd. v. Borneo (Jaarb. v. h. Mijnw., V. Wet. Ged. 183; 1886).

²⁾ Wichmann, Tijdschr. v. h. Kon. Ned. Aardr. Gen., Ser. II, Deel VI, Versl. en

Insel Soek, welche nördlich von Neu-Guinea dem Geelvink-Busen vorge lagert ist. Dazu kommt eine ausserordentliche, petrographische Aehnlich keit zwischen den Alveolinenkalken von Gross-Kei und Neu-Guinea, si dass die Gesteine von beiden Orten einander zum Verwechseln ahnlich sehen; endlich steigen auch auf Neu-Guinea, die betreffenden Gesteine bi zu bedeutenden Höhen empor. Sie bilden die 200-300 M. hohen Klip pen an der Nordwestküste von Neu-Guinea und selbst der 750 M. hohn Lamantsjiri auf Merkus-Ort wird von der Tertiaerformation aufgebaut, wa mit der Höhenlage dieser Bildungen auf Gross-Kei abermals vortrefflich übereinstimmt. Gross-Kei kennzeichnet sich also in jeder Hinsicht al ein Glied von Neu-Guinea und somit als Theil des australischen Continentes. Die Uebereinstimmung im geognostischen Baue mit Neu-Guine ist ebenso scharf ausgepragt wie die Verschiedenheit von den Eilander der malayischen Mulde.

Nachst Kei kommt für die Beurtheilung der australisch-asiatischen Grenz linie vor allem TIMOR in Betracht; denn auch diese Insel zeigt bemei kenswerthe geognostische Eigenthumlichkeiten gegenüber dem malayischen Bogen und den an seiner Innenseite gelegenen Eilanden. Zunachst ist hie die besondere faunistische und petrographische Facies des timoresischen Kohlenkalkes gegenüber demjenigen von Sumatra hervorzuheben 1), ein Unterschied, welcher um so mehr Beachtung verdient, als Anzeichen da für vorliegen, dass auch auf dem Festlande von Australien derselbe rothe Kohlenkalk auftritt. 2) Von Kreideablagerungen ist auf Timor nichts be kannt geworden, trotzdem die Insel in neuester Zeit wiederholt Gegenstand ausführlicher Studien geworden. Dagegen fand Wichmann bei Baung in Amarassi etwa 420 M. über dem Meere einen Nummulitenkalk, welcher sich bei mikroskopischer Untersuchung ausser an Nummulinen auch an Alveolinen reich zeigte und mit keinem aus der malayischen Mulde bekannten Tertiaergesteine sich in Verband bringen lässt.

Die genannten Foraminiseren liessen sich leider nur in Dunnschliffen un

¹⁾ Sammlungen d. Geol. R.-Mus. Leiden, Ser. I, Bd. 1, pag. 49 ff. — E. Kayser but die Vermuthung ausgesprochen, dass es sich minder um eine verschiedene Facies all vielleicht um verschiedene geognostische Horizonte handeln könnte. Kayser vermuthet, dass die Schichten von Sumatra dem Obercarbon, die von Timor dagegen dem Untercarbon angehören könnten. Es liegen aber bis jetzt nicht genügende Materialien zu sicheren Beurtheilung der Frage vor. (Obercarbonische Fauna von Lo-Ping; Richthofen, China IV, Pal. Th., pag. 208). Für die oben angestellte Betrachtung würde die Bestätigung der Auffassung Kayser's übrigens von keinerlei Bedeutung sein.

²⁾ Die wichtigsten Daten u. s. w.

suchen, so dass eine Speciesbestimmung nicht wohl vorzunehmen ist; er der Typus der grossen Nummulina ist durchaus eocaen, und lässt th die Art keineswegs mit N. Cumingii Carp. und dessen Verwandten rgleichen. Die Alveolina ist spindelförmig und bei 6 Mm. Länge in Richtung der Windungsachse 3 Mm. hoch; doch kommen noch grösre Exemplare vor, während die Alveolinen von Gross-Kei weit kleiner d durchschnittlich nur etwa halb so gross sind. Vielleicht liegen zwei rschiedene Species vor. Das einzige indische Gestein, zu dem sich ser an Nummuliten und Alveolinen reiche Kalkstein Timor's in Bezieng bringen lässt, ist vorläufig der Nummulitenkalk der Khirthar-Gruppe Britisch-Indien. Denn auch für diesen Letzteren ist die ausserordenthe Häufigkeit der Gattungen Nummulina und Alveolina charakteristisch, durch das betreffende Gestein überall leicht kenntlich wird, leichter als rch seine Species von Foraminiferen, die dieser, dem Eocaen angehöen Gruppe im Allgemeinen nicht eigenthumlich sind. 1) Sonach wird o das eocaene Alter auch für den Kalkstein von Baung auf Timor sehr hrscheinlich, und hiemit wurde auch der Umstand in Einklang stehen, s an der Sudkuste der Insel ein Chalcedon-Sandstein mit Foraminiferen skommt, unter denen sich nach Schwager's Bestimmung Globigerinen den, die sich dem eocaenen Typus nähern. 2) Ob hier übrigens Schichn vorliegen, welche dem europaeischen Eocaen gleichgestellt werden nnen, lässt sich noch nicht beurtheilen; denn die Schwierigkeit, Gleicherthiges in so entlegenen Gegenden zu erkennen, ist, wie öfters betont urde, ausserordentlich gross, um so mehr als auf Java unzweiselhast mioene Schichten Nummuliten in Ueberfluss führen. 3) Auch Jennings hat ch vor Kurzem darauf hingewiesen, dass eocaene Foraminiferen in Inen möglicherweise in jungeren Schichten auftreten könnten, und zwar me mit den von anderer Seite ausgesprochenen Ansichten über diese rage vertraut zu sein. 4) Wie dem aber auch sein möge, so ist unter aln Umstanden eine nahe Beziehung zur eocaenen Khirthar-Gruppe von nitisch-Indien durch den neuen Fund auf Timor angedeutet. Das Aufeten von Alveolinen weist andererseits auch wieder auf Gross-Kei und en-Guinea hin, wenngleich an letztgenannten Orten das gleichzeitige uftreten von Nunmuliten in den Alveolinenschichten noch nicht bebachtet worden ist.

¹⁾ Medlicott and Blanford, Geology of India II, pag. 458.

⁷⁾ Wickmann, Sammlungen, Ser. I, Bd. 2, pag. 121 und 170.

³⁾ Vgl. Martin, l. c., Bd. 3, pag. 357.

⁴⁾ Note on the Orbitoidal Limestone of North Borneo, (Geolog. Magaz., 1888, pag. 529).

Als wichtig für den Vergleich mit dem benachbarten malayischen Begen ist für Timor schliesslich noch das Fehlen von Vulkanen hervorzieheben, wie Wichmann ausführlich darlegte, "wodurch der Gegensatz deser Insel sich auch in dieser Beziehung gegenüber der grossen Sunda-Reiligeltend macht." 1)

Dass Timor älter wäre als die Inseln der malavischen Mulde, lässt sie freilich nicht behaupten, denn in seinem Innern haben pliocaene Schid ten 2) in Fialarang eine weite Verbreitung, und steigen hier die betreffende Ablagerungen zu bedeutender Höhe an, während an der Kuste ebenfa eine mächtig entwickelte Quartaerformation auftritt. Die Wichmann'sc Sammlung enthält eine Reihe von Versteinerungen, welche einem poros Kalksteine von schmutzigbrauner Farbe entnommen sind, sowie me solche Bildungen auch von anderen Orten als Quartaer kennt, und die Versteinerungen sind, obwohl in Kalkspath umgewandelt, sammtlich (s weit bestimmbar) bekannte Arten des benachbarten Meeres. 3) Die betr fende Ablagerung ist demnach als Quartaer zu bezeichnen, während d Erhaltungszustand der Petrefakte in Verband mit der ziemlich bedeute den Höhenlage der Kalke dafür spricht, dass die Bildung in einer a quartaeren Zeit stattgefunden habe. Die Formation ist aus der Umgeget von Kupang am Berge Tabeno in etwa 80 M., bei Ajer Sago in et 50 M. Meereshöhe angetroffen; sie ist offenbar identisch mit der bere von Beyrich und von Martens als junger Korallenkalk gedeuteten Abl gerung. 4) Jungquartaere Conglomerate sind an der Küste von Ambei und Oikusi auf Timor bereits früher nachgewiesen. 5)

Zur Beurtheilung der Stellung, welche Timor und die Kei-Inseln gegentber der malayischen Mulde einnehmen, verdient vor allem noch die Streichen dieser und der benachbarten Eilande Beachtung. Das mittle Streichen von Gross-Kei ist nach der Hoevell'schen Karte etwa N. 20° O und dieselbe Streichrichtung kommt bei allen übrigen Inselgruppen die Kei-Archipels zum deutlichsten Ausdrucke, in der Insel Kur nicht mit der als in der Taiandu-Gruppe und Nuhuroa. In der Klein-Kei-Gruppe ist es namentlich Nuhutawun, welches genau parallel Gross-Kei sich ausdehnt, sowie ferner die Reihe kleiner Eilande, die sich südwestlich von Nuhututut nach der Kei-Tenimbar-Gruppe hinziehen. Dass das Streichen

¹⁾ l. c. pag. 166. 2) vgl. Anhang, No. 3. 3) vgl. Anhang, No. 4.

⁴⁾ Beyrich, Kohlenkalkf. auf Timor, pag. 65. — E. v. Martens, Banda, Timor und Flores. (Zeitschr. d. Gesellsch. f. Erdkunde zu Berlin, 1889, Bd. 24, pag. 91).

⁵⁾ Sammlungen, Ser. I, Bd. 1, pag. 63.

an manchen Punkten von Nuhututut verwischt erscheint, ist den jungquartaeren Riffbildungen daselbst zuzuschreiben; dagegen kommt es wiederum in der Richtung der Flüsschen und Bäche der grösseren Inseln aum deutlichsten Ausdrucke.

Es ist nun bekannt, dass die jungquartaeren Bildungen nicht nur, sondern auch die tertiaeren Ablagerungen von Gross-Kei sich in nahezu schwebender Lage befinden; von einer grösseren Sattel- und Faltenbildung ist innerbalb dieser jugendlichen Formationen nirgends etwas wahrzunehmen. Es liegt deshalb die Annahme vor der Hand, dass das Streichen der Keilasela durch die älteren Formationen, welche als Liegendes der tertiaem und quartaeren Kalkplatten auftreten müssen, vorgezeichnet sei. Nun treichen die benachbarten Aru-Inseln, die ebenfalls von jungeren Kalk-Maken bedeckt werden, N.-S. 1); Timor-Laut dehnt sich in der Richtung on S.W. nach N.O. aus und Timor desgleichen, nur mit grösserer Abwichung nach O., wodurch seine Längsachse derjenigen des benachbarm malayischen Bogens mehr genähert wird. Doch weicht auch Timor noch sehr betrachtlich aus der Reihe der Sunda-Inseln heraus. Dass hier in den genannten Inseln Reste von Faltenzugen vorliegen, welche im Osten der Banda-See vorherrschend N.-S. gerichtet sind, im Sudwesten aber mehr nach Westen zu sich umbiegen, ist eine Anschauung, die sich Einem unmittelbar bei Betrachtung der Karte aufdrangt, und diese Faltenzige verlaufen parallel der Grenze der Flachseegebietes, welches Austraben und Neu-Guinea mit einander verbindet. Es kann unmöglich ein Zufall genannt werden, dass die 200 Metergrenze zwischen Aru- und Kei-Inseln nahezu parallel den Letzteren gerichtet ist und im Sudosten von Timor wiederum parallel dem Streichen dieses Eilandes 2). Die Inseln, welche durch ein dem malayischen Becken so fremdes Streichen ausgezeichnet sind, deuten daher den aufgewulsteten Rand einer von dem asiatischen Continente geschiedenen Masse, die Grenze des australischen Continentes, an.

¹⁾ Van Hoevell, De Aroe-eilanden (Tijdschr. v. Ind. Taal-, Land- en Volkenk., 1889, XXXIII, pag. 57). Die meisten Inseln der Aru-Gruppe erheben sich kaum über den Marespiegel, als gehobene Korallenriffe und Sandbänke; nur wenige erreichen 30 Fuss Höbe, und nur an einem einzigen Punkte im S.W. befindet sich eine ± 120 Fuss über den Ocean erhobene, aus Kalk und Sandstein aufgebaute Küste, deren Formation Hoewil für Tertiaer hält (l. c. pag. 72). — Vgl. auch Martin, Sammlungen, Ser. I, Bd. 1, 198. 73 und 178.

Berghaus' Physikal. Atlas N°. 25. — Petermann's Mittheilungen, 1889, Bd. 35,
 168. Die Tiefenkarte des Indischen Oceans.

Der Gegensatz zwischen der Richtung von Kei- und Aru-Inseln einer seits, und derjenigen der Inselreihe Java-Wetter andererseits, ist ein st augenfälliger, dass er nicht weiter hervorgehoben zu werden braucht; da gegen verdient es Erwähnung, dass das herrschende W.—O. Streichen auch an anderen Punkten der malayischen Mulde, innerhalb des oft ge nannten Bogens, deutlich zu constatiren ist. Es tritt uns in Buru und Ceram entgegen, ferner in der Inselreihe Taliabo, Mangula, Obi, Misol, deren Fortsetzung im östlichen Theile des mittleren Celebes liegen durfte Endlich ist es in dem nördlich vom Golfe von Tomini gelegenen Theile der letztgenannten Insel scharf ausgeprägt 1), und wenn andere Gebiett von Celebes dem widersprechen, so ist die Erklärung theilweise wohl darin zu suchen, dass ansehnliche Gebiete des Eilandes in vortertiaeren Zeit überhaupt noch nicht bestanden.

Es kann auch schwerlich ein Zufall sein, dass das in so auffälliger Weise abgestutzte Sudende von Celebes in dem Pik von Bonthain einen durch Wichmann²) als Vulkan erkannten Kegel besitzt, während die unmittelbar benachbarte Südküste wiederum parallel der javanischen Vulkanreihe verläuft. Auch Madura streicht in gleichem Sinne, sammt den östlich sich anschliessenden Inseln, und das ist um so mehr von Bedeutung, als hier das Grundgebirge nachgewiesen worden ist. Ueber die Richtung der Hauptgebirgsketten von Borneo befinden wir uns noch heute in Zweifel; in West-Borneo streichen die altesten, mesozoischen Sedimente wiederum im Allgemeinen W.—O., mit Abweichungen in der Richtung S.O.—N.W.

Es wird sich nun bei der Frage nach der Scheidung des australischen und asiatischen Continentes nicht darum handeln, eine Linie zu suchen, welche mit gleicher Schärfe gezogen werden könnte, wie eine politische Grenze, und es wäre auch kaum nothwendig, dies hier zu betonen, wenn nicht von Seiten mancher Geographen die Wallace'sche Grenzlinie in der That in gedachtem Sinne verwerthet worden wäre. Der amerikanische Doppelcontinent bietet auch hierfür wiederum ein lehrreiches Beispiel; denn die geognostische Scheidungslinie beider, durch grosse Selbständigkeit ausgezeichneter Continentalmassen liegt nicht in der Landenge von Panama, sondern weiter nördlich. Die grossen Antillen lassen sich nicht,

¹⁾ Das Centralgebirge von Gorontalo ist auch gleich dem betreffenden Abschnitte des Eilands W.—O. gerichtet (vgl. u. a. Van Schelle, Jaarboek v. h. Mijnwezen, 1889, p. 17).

²⁾ Tijdschr. v. h. Kon. Ned. Aardrijksk. Genootsch., 1889, Ser. II, Deel VI, Versl. en Mededeel, pag. 90.

ohne einen geologischen Missgriff zu begehen, von der gleichartigen Cordilere Venezuela's scheiden, wahrend westlich von diesen Inseln vermuthlich Yucatan das Grenzgebiet von Nord- und Süd-Amerika bezeichmet. Aber im Norden von Yucatan, Cuba und Haiti ist trotzdem die
Trennung keineswegs scharf ausgeprägt, denn die Bahama-Inseln vermitteln hier den Anschluss an Florida.

So nimmt nun, gleich dem Grenzgebiete des Caraibischen Meeres in Amerika, auch die Umrandung der Banda-See eine trennende und doch deichzeitig vermittelnde Stellung zwischen den peripherischen Inselgebieen der continentalen Rumpse von Asien und Australien ein. Die Banda-See schiebt sich als ein scharf umschriebenes Sengkungsfeld zwischen die assedehnten Flachseegebiete ein, welche einerseits Neu-Guinea und bemachbarte Inseln mit Australien, andererseits Borneo, Java, Sumatra u. s. w. mit Asien verbinden. Dies Becken ist nach der Seite des australischen Continentes hin durch eine Reihe von Vulkanen umgeben, und in deren insserem Umkreise lagert ein Gebirge, welches die von West nach Ost weichenden Inseln im Osten der Java-Reihe mit den im gleichen Sinne zweichenden Eilanden im Norden der Banda-See verknupft. Dieser letzterwähnten Zone gehört auch Kur an. Es folgen dann weiter nach aussen Inseln, welche durch ein dem malavischen Becken fremdes Streichen sich ak Reste eines anderen Faltengebietes kennzeichnen, und dies um so mehr, als mit der abweichenden Längserstreckung der Eilande ein wesentich verschiedener geognostischer Bau gepaart geht. Das darf mindestens ftr Gross-Kei und Timor, die einzigen Inseln der betreffenden Zuge, welche bis jetzt näher bekannt sind, als sicher bewiesen gelten, und zugleich steht dieser Verschiedenheit von dem geognostischen Aufbaue der mabyischen Mulde eine in verschiedenen, wesentlichen Punkten erwiesene Vebereinstimmung mit Theilen des australischen Continentes gegenüber. Im Westen von Gross-Kei und im Nordwesten von Timor liegt somit eine naturliche, geognostisch wohlbegrundete Trennungslinie zwischen den von dem asiatischen und australischen Continente abgegliederten Inseln.

Gleichzeitig leitet aber der aussere Bogen der Umrandung der Banda-See, die Inselreihe von der östlichen Endigung Ceram's bis nach Kisser, in das australische Faltengebiet hinüber, wie namentlich in der Kei-Gruppe deutlich zu erkennen ist, und wiewohl eine Reihe theoretischer Erklärungsversuche hiefür gegeben werden könnte, so müssen dieselben doch vorläufig aus Mangel gründlicher Kenntniss vom geognostischen Baue des Umkreises der Banda-See unterbleiben.

Auch thier- und pflanzengeographische Betrachtungen sind hier nicht am Platze; denn die Frage nach der continentalen Grenze ist zunächst rein geologischer Art. Es kann sich nur darum handeln, diejenigen Schollen der Erdkruste aufzusuchen, welche seit langen, vielleicht seit den altesten, Zeiten eine grosse Selbständigkeit gegenüber den oceanischen Becken behauptet haben, und diese Selbständigkeit ist nicht davon abhängig, ob peripherische Theile der Continentalmassen zeitlich verbunden oder durch das Meer oberflächlich geschieden sind 1). Die letztgenannten Umstände beherrschen aber die Verbreitung von Thier- und Pflanzenwelt, und es heisst daher die Fragestellung verwirren, wenn man deren Ergebnisse mit denjenigen geologischer Forschung auf eine Linie stellen will. Welche hohe Bedeutung die verschiedene Vertheilung der organischen Welt im Hinblick auf die centralen Gebiete der Continente auch haben mag, es ist doch von vornherein nicht zu erwarten, dass am continentalen Aussenrande der heutige faunistische und floristische Charakter einzelner Inseln mit der geologischen Trennungslinie in direktem Zusammenhange stehe oder sich gar mit ihr decke.

So ist es denn auch sehr verstandlich, wenn Ed. v. Martens entgegest Wallace zu dem Schlusse kommt, dass "Timor und Celebes, die Philippinen und die Inseln östlich von Java eben das Mischungsgebiet beider Thierwelten darstellen (von Australien und Asien) und ebensogut keiner von beiden als beiden angehören. Fast jede Thiergattung ergiebt wieder eine andere Grenze; eine scharfe Gesammtgrenze existiert in der Natur auch hier nicht". 2)

¹⁾ Das ist Schuiling jedenfalls unbekannt gewesen; sonst würde er mir, über die australisch-asiatische Grenzlinie schreibend, wohl nicht den Vorwurf einer Inconsequem gemacht haben (Tijdschr. v. h. Kon. Ned. Aardr. Genootsch., 1888, Ser. II, Deel V Meer uitgebr. artik., pag. 523 ff. — vgl. speciell pag. 559). Ich kann Schuiling nur em pfehlen, sich zunächst mit den Elementen der Geologie vertraut zu machen, bevor E Dinge schreibt, die ernstlich zu widerlegen ich nicht für nöthig halte.

²⁾ Banda, Timor und Flores, Tagebuchnotizen von E. v. Martens (Zeitschr. d. Gesellsch. f. Erdkunde zu Berlin, 1889, Bd. 24, pag. 83 ff. — vgl. speciell pag. 104).

ANHANG.

1. NOTIZ UEBER DAS PLIOCAEN VON GORONTALO.

Nach der Sammlung v. Schelle's. (Vgl. oben pag. 265).

Zwischen Gorontalo und Limbotto traf v. Schelle einen Schichtencompler an, welcher aus Sandstein, theilweise mit Thongehalt, besteht und sich in nahezu schwebender Lage befindet. Van Schelle ist der Ansicht, dass die Ablagerung in einem alten Seebusen stattgefunden, welcher nur durch eine schmale Strasse mit dem Golf von Tomini verbunden war, und war dort, wo jetzt der Fluss von Gorontalo fliesst. Im Umkreise des aupponirten Beckens stehen Kalksteine an. Versteinerungen fanden sich bewoders in den thonigen Sandsteinen, und v. Schelle vermuthet, dass sie vielleicht den Charakter einer Brakwasserfauna tragen durften, da die Verbindung des alten Beckens mit dem offenen Meere nur eine sehr unwilständige gewesen. Als letzter Ueberrest des alten Busens sei der jetzige See von Limbotto zu betrachten, eigentlich nur noch ein Sumpf mit einer wenige Meter betragenden Vertiefung in der Mitte. 1)

Von den in sehr zahlreichen Exemplaren übersandten Petrefakten untersuchte ich bis jetzt nur die Gastropoden naher, welche an Zahl bedeutend hinter den Muscheln zurückstehen, obwohl auch Letztere in dem unternein reichen Materiale nur durch verhaltnissmässig wenige Arten vertreten ind. Inzwischen genügen die Gastropoden durchaus, um das Alter der betreffenden Ablagerung festzustellen. Sie ist, wie die nachstehende Liste wigt, aequivalent mit der pliocaenen Formation von Fialarang, da sich inter den 6 bestimmbaren Species nicht weniger als 5 fanden, welche beiden Orten gemeinsam sind, während von Letzteren obendrein 3 dem hiocaen von Fialarang eigenthumliche, ausgestorbene Species repraesenten; die übrigen 3 sind noch lebende Arten des benachbarten Meeres. Obwohl die Fossilien meist als Steinkerne vorliegen, so konnte die sichere Bestimmung doch dadurch erfolgen, dass die Abdrücke der Gehäuse beichzeitig in ausserordentlicher Schärfe in der anhängenden Gesteins-

¹⁾ Ich stütze mich hier auf briefliche Mittheilungen v. Schelle's. Seither ist von demben eine interessante Arbeit über den Gegenstand erschienen: Opmerkingen over de leigie van een gedeelte der Afdeeling Gorontalo. — Jaarb. v. h. Mijnw. 1889, II, 115 (Zusatz während des Druckes).

masse überliefert sind, während das ausserst reichhaltige Untersuchungs material und der Mangel jeglicher Deformirung der sicheren Beurtheilung ebenfalls sehr förderlich waren.

Die Gastropoden der pliocaenen Ablagerung von Gorontalo sind folgende:

Potamides (Terebralia) Wichmanni Mart. 1) Auch in Fialarang au Timor.

Telescopium Titan Mart. 2) Auch in Fialarang.

Cerithium (Vertagus) Jonkeri Mart. 3) Auch in Fialarang.

Strombus isabella Lam. Auch in Fialarang.

Nassa (Zeuxis) siquijorensis Ad. Auch in Fialarang. Vereinzelt.

Mitra (Turricula) spec. indet. Vereinzelt.

Conus spec. indet. Vereinzelt.

Bulla (Atys) naucum L. Vereinzelt.

Die Analogie, welche der See von Limbotto in Lage und Entstehung zu denjenigen von Sindenreng und Tempe zeigt, ist eine ausserordentlich grosse, und da noch eine Reihe anderer Wasserbecken, welche in gan ahnlicher Weise einen Fluss zum Meere entsenden, auf Celebes existiert so ist die Frage zu untersuchen, ob nicht allen dieselbe Entstehung zu geschrieben werden musse. Damit soll nicht angedeutet werden, dass dies Seen alle gleichaltrig und in quartaerer Zeit gebildet seien; es ist das viel mehr schon wegen der verschiedenen Höhenlage nicht wohl möglich. Alle Seen könnten aber theils in tertiaerer theils in quartaerer Zeit Meeres becken gebildet haben, die nur durch einen schmalen Canal, vielleich durch eine Einschartung in Korallenriffen, mit dem Oceane verbunder waren. Beim Zurückzuge des Meeres gestalteten sich dann die Canale zi Flussen um, die sich mehr und mehr verlängerten, in dem Maasse, wie die Verschiebung der Strandlinie vorruckte. So halte ich es für möglich dass der 696 M. hoch gelegene, seichte See von Tondano, von dem be reits Hickson 4) sagte, dass er ihn nicht als Kratersee betrachte, auf gans ähnliche Weise in tertiaerer Zeit entstanden sei, wie die Seen von Limbotto Tempe und Sindenreng in einer jungeren Periode. Der Wasserfall Ton

i) Vgl. Näheres über diese Art unten bei Timor.

²⁾ Sammlungen G. R.-M. Leiden, Ser. I, Bd. 4, pag. 235.

³⁾ Daselbst Bd. 3, pag. 148.

⁴⁾ S. J. Hickson, A Naturalist in North Celebes, London 1889, pag. 220.

sea lama 1), welcher in dem durch den See gespeisten Flusse von Menado austritt, könnte in der ehemaligen Userlinie gelegen sein.

Ausser dem See von Tondano verdienen derjenige von Bolano sowie die Seen im Westen des Golfes von Tomori und das ähnliche Becken Koriijangung in der angedeuteten Richtung näher geprüft zu werden.

2. GASTROPODEN AUS QUARTAEREN ABLAGERUNGEN VON CELEBES.

Nach der Sammlung Wichmann's. (Vgl. oben pag. 264).

a. Umgegend von Tempe.
(Meeresablagerung mit eingeschwemmten Süsswasserbewohnern.)

Turritella duplicata Lam. Abgerolltes Exemplar.

Melania perfecta Mouss. Sehr frisch.

Potamides (Terebralia) palustris Brug.

Telescopium fuscum Chemn. Mit Farbenresten.

Cypraea tigris L. Mit wohl erhaltenen Farben. 2)

Tritonium spec. indet. Bruchstück einer sehr grossen Art.

Conus spec. indet. Bruchstück.

b. An einem Felsen bei Tjabili, unfern Pankadjene.
(Süsswasser-Ablagerung.)

Neritina pulligera L.

Melania perfecta Mouss. var.

Melania semicancellata v. d. B. (?). Bruchstück.

c. Zwischen Tello und Parangloë bei Makassar.
(Meeresablagerung mit eingeschwemmten Süsswasserbewohnern.)

Natica mamilla Lam. Melania tuberculata Mull.

¹⁾ Schreibweise von Hickson, englisch. Wohl gleich Tonsie lama.

²⁾ Die Rückseite dieses Exemplares zeigt einen glatten Fleck. Weber theilt mir mit, dass dieser ohne Zweisel davon herrühre, dass die Muschel zum Glattstreichen des Sarongs benutzt worden sei, wie dies allgemein auf Celebes gebräuchlich und demnächst von ihm im Internat. Archiv f. Ethnogr. Theil III, Suppl. publicirt werden solle; — Es ist also möglich, dass dies einzelne Exemplar nicht ursprünglich von Tempe abtänftig war; doch gilt dies nicht für die übrigen Schneckengebäuse und wird also die eben gezogene Schlussfolgerung nicht weiter dadurch beeinflusst (Zusatz während des Drackes).

Cerithium spec. indet.

Strombus isabella Lam.

Strombus urceus L

Strombus gibberulus L (?)

Nassa (Zeuxis) crenulata Brug.

Rapana carinifera Lam.

Murex tribulus L.

Conus magus L.

d. Umgegend von Tangka bei Balangnipa. (Moeresablagerung.)

Strombus luhuanus L. Mit Farbenresten.

3. NOTIZ UEBER DAS PLIOCAEN VON TIMOR.

Nach der Sammlung Wichmann's. (Vgl. oben pag. 270).

Pliocaene Versteinerungen von Fialarang in Timor habe ich früher auf Grund der Sammlung Jonker's beschrieben. 1) Wichmann besuchte auf seiner Reise dieselbe Gegend und sammelte daselbst eine grosse Reihe schöner Versteinerungen, welche den gleichen Erhaltungszustand zeigen wie diejenigen von Jonker, so dass sie schon deswegen als derselben Schicht entnommen betrachtet werden durften. Die Bestimmung der Arten bestätigte dies ferner; es fanden sich dabei nur sehr wenige Species, welche nicht auch durch Jonker schon gesammelt wären. Daraus ist gleichzeitig zu schliessen, dass die kleine Fauna aus dem Pliocaen von Timor im Wesentlichen ausgebeutet ist; ihr Charakter macht es wahrscheinlich, dass sie in einem ziemlich abgeschlossenen Busen gelebt habe, ähnlich wie dies für die pliocaene Fauna von Limbotto auf Celebes oben hervorgehoben wurde.

Die folgende Liste enthält fast sämmtliche von Wichmann gesammelte Arten und noch einige wenige aus Jonker's Sammlung, die mir erst später durch van Dijk zugestellt wurden, nachdem das Hauptmaterial bereits a. a. O. bearbeitet war. Eine nähere Beschreibung einzelner Objekte behalte ich mir für später vor.

¹⁾ Sammlungen, Ser. I, Bd. 3, pag. 305.

GASTROPODEN.

Turritella vulgaris Mart. von Fula Munu.

Cerithium (Vertagus) Jonkeri Mart. von Fula Munu. Darunter Varietaten, welche sich dadurch auszeichnen, dass sie gröber gerippt sind und dass die Sculptur des Gewindes sich mehr oder minder vollstandig bis auf die Schlusswindung fortsetzt.

Cerithium (Vertagus) spec. indet. von Fula Munu. Neu für Timor; vermuthlich auch eine neue Art.

Potamides (Terebralia) Wichmanni spec. nov. von Fula Munu und Kassi Marinu (coll. Jonker). Die Art steht Pot. palustris Brug. nahe, welche auch von Nias bekannt ist, unterscheidet sich aber durch ein minder schlankes, plumpes Gehäuse und durch den Besitz von nur zwei Furchen auf den Umgangen, wahrend die genannte, noch lebende Species meist drei, seltener vier Furchen trägt.

Potamides (Pyrazus) sulcatus Brug. von Fula Munu. Eine gröber gerippte Varietät als diejenige, welche früher von Timor bekannt wurde; doch kommt dieselbe Spielart auch lebend vor.

Potamides (Cerithidea) Jenkinsi Mart. von Fula Munu. Neu für Timor. Kommt auch im jüngeren Tertiaer von Java vor.

Telescopium Titan Mart. von Fula Munu, Kassi Marinu, Mottamerak Lamakane, Wejmeu (zum Theil aus coll. Jonker).

Strombus isabella Lam. von Fula Munu und Kassi Marinu.

Nassa (Zeuxis) siquijorensis Ad. von Fula Munu. Eine fein gerippte Varietat.

Nassa (Zeuxis) olivacea Brug. von Fatu Lulih (neuer Fundort; coll. Jonker).

Pollia luliana Mart. von Fula Munu.

LAMELLIBRANCHIATA.

Ostrea incisa Mart. von Fula Munu und Kassi Marinu. Grosse und vollstandige Exemplare, welche in solcher Erhaltung noch nicht bekannt waren.

Placuna sella Gm. von Fatu Lulih.

Arca granosa L. von Fula Munu und Mottamerak Lamakane.

Arca rustica Mart.; von Fula Munu ist eine Varietat vorhanden, welche mehr zur dreiseitigen Form neigt, und von Wejmeu Exemplare, die mit den typischen durchaus übereinstimmen. Arca Burnesi d'Arch. von Fula Munu, Fatu Lulih und Kassi Marinu.
Darunter Exemplare von bedeutender, bis jetzt unbekannter Grösse.
Venus squamosa Lam. von Fula Munu.
Venus chlorotica Phil. von Fula Munu.
Corbula scaphoides Hinds. von Fula Munu.

4. GASTROPODEN AUS DEM AELTEREN QUARTAER VON TIMOR.

Nach der Sammlung Wichmann's. (Vgl. oben pag. 270).

Turbo petholatus L. (?) vom Berg Tabeno bei Kupang.

Turbo spec. indet. Berg Tabeno (schlecht erhaltenes Bruchstück einer spiralgerippten Art).

Trochus noduliferus Lam. Bei Ajer Sago.

Trochus maculatus auct. Bei Ajer Sago; ferner zwischen Tabeno u. Bakanassi.

Pterocera millipeda Lam. Berg Tabeno.

Strombus gibberulus L. Bei Ajer Sago.

Strombus luhuanus L. Berg Tabeno und Ajer Sago.

Strombus spec. indet. Berg Tabeno (schlecht erhaltener Rest).

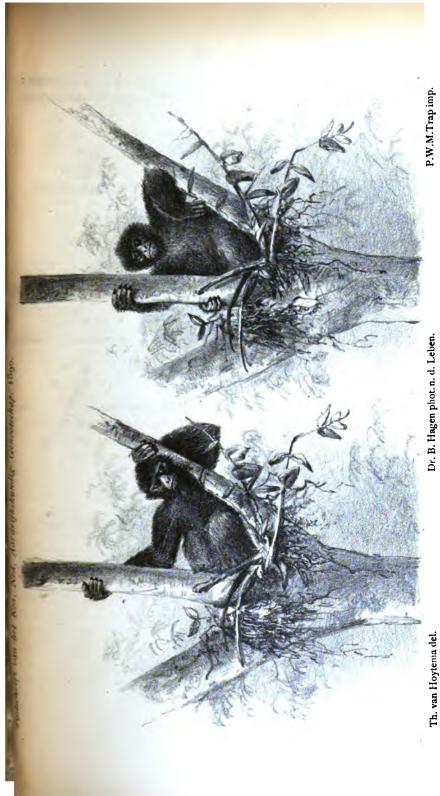
Dolium costatum Desh (?). Bei Ajer Sago (schlecht erhalten).

Oliva spec. indet. Bei Ajer Sago.

Terebra maculata L. Berg Tabeno.

Conus radiatus Gmel. Berg Tabeno.

Abgeschlossen 20. Febr. 1890.



Dr. B. Hagen phot. n. d. Leben. HYLOBATES SYNDACTYLUS Carrier.



BUDRAGEN TOT DE HYDROGRAPHIE EN MORPHOLOGIE DER ZUIDE-LIJKE ZEEGATEN EN RIVIERMONDEN IN NEDERLAND.

DOOR

E. ENGELENBURG.

Civiel Ingenieur.

Man being the servant and interpreter of nature, can do and understand so much, and so much only, as he has observed, in fact or in thought, of the course of nature. Beyond this he neither knows anything nor can do anything.

Becon's Novum Organum, Aphorism I.

"De verbetering van benedenrivieren is van alle voorname vraagstukken der waterbouwkunde een van de nieuwste en de minst wetenschappelijk behandelde. De weinige voorbeelden van goed uitgevoerde verbeteringen, zooals die van de Clyde en Tyne, wijzen in hun geschiedkundig verloop op tal van mislukte pogingen en op talrijke veranderingen van stelsel. Eerst na aanmerkelijke geldoffers en harden strijd der verschillende meeningen kwam een heldere (?) overtuiging aan den dag van de juiste middelen, die men moest aanwenden. Als voorbeeld van beginsellooze rivierverbetering van jeugdige dagteekening kan dienen, die der Beneden-Seine tusschen Rouaan en Havre, waar — overeenkomstig de wijze van werken, toepasselijk op de bovenrivieren — slechts ondiepe vakken zeer sterk vermauwd en verdiept zijn, zonder dat de geheele toestand van het vloedgebied der tijrivier in aanmerking genomen is". Aldus schrijft de Oberhaudirector L. Franzius in het Centralblatt für Bauverwaltung 1882, zie ook Verh. Kon. Inst. v. I. 82/83 blz. 78.

Ook in Nederland zijn op hydrographisch gebied talrijke machtspreuken en daarbij menige dwaling gangbaar. Zelfs bij een vluchtige litteratuurinzage kan een onbevooroordeeld persoon zich overtuigen hoe hypothese op hypothese is gestapeld, hoe verschillende schrijvers over deze onderwerpen elkaar beschouwingen en cijfers hebben nageschreven, zonder dat men ooit door een logische verklaring, gebouwd op waarnemingen, feiten, cijfers of theoretische stellingen tot de ware oorzaken heeft trachten op te klimmen 1).

Millioenen gelds zijn en worden nog voortdurend ten koste gelegd aan de verdediging onzer stranden, kusten en dijken of aan de verbetering van riviermonden en zeegaten en slechts luttele sommen zijn er besteed aan het onderzoek der verschijnselen, op welker kennis toch ieder ontwerp gegrond moet zijn.

Terecht is men nooit teruggedeinsd voor de kosten, die gevraagd werden om Nederland tegen de aanvallen van den machtigen zeegod te beschermen of om aan de eischen der volkswelvaart, door handel en scheepvaart gesteld, te voldoen. Maar waar werken, die op millioenen zijn begroot, bij uitvoering het vijfdubbele blijken te kosten, zijn de vragen gewettigd of niet met minder geld even goede, zoo niet betere, toestanden te verkrijgen waren, of bij de uitvoering wel altijd van deugdelijke gronden is uitgegaan. Bij vele der werken tot oeververdediging of instandhouding en verbetering van vaarwegen zijn dikwerf door het toeval de al of niet gunstige gevolgen bepaald geworden. De geschiedenis leert, dat gunstige toestanden uitbleven, waar zij met zekerheid verwacht werden, ja zelfs nuttig geoordeelde werken slechte gevolgen hadden, zooals o. a. in Zeeland bij het leggen van dammen aan de overzijde van een te beschermen oever (zie over de plannen van de Kanter, Miłborn, Ockenburgh (1784-89) en Magielse (1869-70) J. F. W. Conrad, Waterb. Aant. over de Zeeuwsche Oeververdediging, 1874).

Omgekeerd ontstonden soms gunstige toestanden, waar men meende vaarweg of oeververdediging in gevaar te zien. Zulks behoeft niet te verwonderen, wanneer men bemerkt hoe weinig er verricht is, hetzij door waarneming, hetzij door studie, om de ingewikkelde verschijnselen, welke zich voor de kusten en binnengaats dagelijks gedurende eeuwen herhalen, te doorgronden ²).

¹⁾ Zie o. s. "de Ingenieur", N°. 5 en 9, jaarg. 1889 en Ann. Hydrographie 1889, Heft VIII.

²⁾ Onder de voornaamste zijn nog steeds te rekenen met liet hierboven geneemde

Onder de jammerlijke hypothesen, welke schatten verzwolgen hebben, behoort in de eerste plaats die genoemd te worden, welke een diephouing der zeegaten aan den ebstroom toeschrijft en de noodzakelijkheid an den zoogenaamden vloedscheppenden vorm der zeegaten.

Hetzij vergund dit met één enkel voorbeeld, ontleend aan een officieel apport, in herinnering te brengen. "Bij den mond der rivieren ontstaat ngzamerhand door de vereenigde werking van het binnenwater en van e eb, een afneming van het land ten zuiden en een aanwinst ten noorm van de uitmonding".

Juist het omgekeerde is het geval. Niet de eb- maar de vloedstroom pudt onze zeegaten op diepte. Voor een goeden vaarweg of riviermoning is eer een richting loodrecht op de kust of nog meer in noordelijke ching, dus volstrekt niet "vloedscheppend" aan te bevelen. De werking reb met betrekking tot de diepte is niet geheel buitengesloten, doch de zeegaten aanmerkelijk minder dan die van den vloed; ja zelfs is zij vor een groot deel nadeelig aan de diepte. Zij komt eerst bij riviermonen of nog nauwere openingen (zooals toegangen naar havens of uitateringssluizen) op den voorgrond. Doch strikt genomen heeft men in it laatste geval niet meer met het verschijnsel van eb te maken, maar echts met het wegvloeien eener zekere hoeveelheid water, zonder dat erbij getijstroomen optreden.

Het volledige bewijs dezer contradictoire stellingen ligt thans niet binen het bereik van een enkel persoon, omdat behalve talrijke historische derzoekingen, bestudeeringen van den feitelijken toestand der zeegaten, viermonden en kusten aan de hand van peilingen, getijmeter- en stroomaarnemingen (grootendeels ontbrekende) hiervoor een vereischte zijn. In volgende bladzijden vermenen wij een eerste schrede in deze nieuwe chting te zetten, vertrouwende daarbij menig onbekend gezichtspunt te penen en hopende de Nederlandsche ingenieurs, vooral hen, die door in werkkring het meest daartoe in staat zijn, tot dergelijke studies op wekken.

In de eerste plaats rijst de vraag: welke bewegingen heeft het water onze kust? en daarbij treden van zelf als overwegend de getij-

wit van den hoofdingenieur J. F. W. Conrad de voorbeeldige studies van den tegenwordigen hoofdinspecteur van den waterstaat P. Caland; de eene bevat een historisch benoek der zeewerken op Goedereede, K. I. I., Verh. 57/58, bl. 41—48, de andere moderzoek van den feitelijken toestand der Maas onder den titel: Over vloed en eb phesedenrivieren, K. I. I., Verh. 60/61, bl. 29—58.

stroomen op den voorgrond. Daarneven stelt zich dadelijk de eisch om onderscheid te maken tusschen zeegat en riviermond. Onmiddelijk daarna dringt zich de vraag op: bepalen de stroomen den kustvorm, zooals ook omgekeerd de kustvorm den stroom bepaalt? Deze laatste vraag impliceert weer die: welke verplaatsing der zanddeeltjes kunnen of moeten een gevolg zijn van deze stroomingen? Tevens zal daarbij een tot nu toe nog veronachtzaamde invloed op de stroomrichting en een eveneens verwaarloosde oorzaak der sedimentvorming ter sprake komen.

Veronderstellen we een met constante snelheid voortijlenden zeestroom of rivier, terwijl het water de bij die snelheid behoorende maximum hoeveelheid zand in zwevenden toestand met zich mede voert, dan zal, ondanks de totale hoeveelheid der zwevende stoffen onveranderd blijft, tengevolge van uiterst kleine locale oorzaken, voortdurend een wisseling der medegevoerde en op den bodem vertoevende zanddeeltjes plaats grijpen. Dit wordt duidelijk, wanneer men bedenkt, dat een uiterst dun laagje van den bodem in geringe mate aan de beweging van het daarover vloeiende water deelneemt. Er is dan een zekere snelheid noodig om de, hetzij van boven, hetzij uit zee meegevoerde stoffen zwevende te houden. Bepalen wij ons eerst tot het rivierwater. Er zijn dan twee redenen op te geven, welke in den mond de noodzakelijke snelheid verminderen, 1°. is de riviermond wijder en het verval geringer dan hooger op; 2°. werkt het voorstaande of indringende zeewater als een dam, die de uitvloeiing, al is het dan ook slechts periodiek, tracht te beletten.

Maar het is niet alleen de snelheid, welke het al of niet bezinken der vaste stoffen bepaalt. Juister uitgedrukt is het de levende kracht van het uitstroomende water; van daar dat de Amazone bij zeer flauw verhang van den waterspiegel nog 50 D. mijlen uit de kust is waar te nemen.

Loopt de rivier in zee uit, dan heeft niet onmiddellijk vermenging van rivier- en zeewater plaats, wegens het grooter soortelijk gewicht (1.028) van dit laatste. Het zeewater schuift zich wigvormig onder het rivierwater en omgekeerd. Van de zeer dun uitloopende laag rivierwater worden enkele stukken als oliedrijvende eilanden afgescheurd, welke soms nog geruimen tijd als afzonderlijke vlekken door de zeestroomen heen en weer gevoerd worden (zie o. a. Verslag omtrent de waarn. in de Noordzee in de jaren 1880—82, H. Bernelot Moens en R. P. J. Tutein Nolthenius, blz. 101).

Bij sterke getijstrooming heeft de vermenging spoediger plaats. Het beneden gedeelte der rivier is met brakwater gevuld, doch ook hier heeft gedeeltelijk de laschvormige op en onder elkaar heenstrooming der verschillende watermassa's plaats. Hiervan is het gevolg, dat tot daar, waar de nviermonding zich verwijdt, het zeewater opdringt en dus reeds neerstag plaats grijpt. Op verschillende oogenblikken worden over de geheele lengte, waar het tij merkbaar is, stoffen afgezet. En wat eindelijk van de fijnere stoffen nog niet gevallen is bereikt ôf de zee ôf valt juist in de uiterste deelen van den mond. Wijl op deze plaatsen de stroomsnelheid te gering is en zich voortdurend verplaatst met het tij, heeft geen regelmatige afzetting eerst der grovere en daarop der fijnere zanddeelen plaats, maar worden soms fijne sedimenten spoedig bezonken en grove soms tot in zee meegevoerd. Om dezelfde reden zijn de door deze bezinkingen gevormde platen en banken voor en in den mond veelvuldiger en spoediger aan veranderingen onderhevig dan de hooger gelegene.

Tot nu toe behandelden wij slechts de rivier- en ebstrooming. Dezelfde oorzaken, welke neerslag teweeg brengen, beheerschen den vloedstroom, doch tevens komt deze de veel gewichtigere functie der diephouding toe. Allereerst merken wij op, dat de buiten en onmiddellijk voor den mond, als deze zeer wijd is, bezonken stoffen door den vloedstroom en ook deels door den ebstroom voortdurend worden verplaatst, hierdoor ontstaan gebeel van de rivier onafhankelijke geulen en platen. Even als het door de nvier afgevoerde zand ten slotte geheel bezonken wordt, waar de snelheid het kleinst is, d. i. aan de uiterste grenzen zeewaarts van den mond, 200 valt het door den zeestroom aangevoerde zand eerst daar neer, waar de snelheid van den vloedstroom onvoldoende of uitgeput is, d. i. zeer diep in den mond. Het asstroomende rivierwater verliest, zooals wij gezien hebben, over een aanmerkelijken afstand geleidelijk zijn' snelheid en vormt dus over deze geheele strekking een neerslag. Geheel anders is het met den vloedstroom gesteld. Eenmaal binnen de uiterste banken, voor de zuidelijke Nederlandsche zeegaten, dus binnen de overblijfselen der oude strandbarrière, wordt het bed niet wijder, maar enger, de stroom wordt dus meer samengeperst, de snelheid grooter, dientengevolge wordt eer zand losgewoeld dan neergeslagen, zoodat eerst in het binneneinde van den mond de vloedstroom als 't ware door botsing tegen het rivierwater nagenoeg al het door hem meegevoerde zand, en nu in eens, val-

Wegens de zooeven vermelde laschvormige, op elkaar plaatsing van zee en rivierwater, is de snelheid op den bodem bij vloedstroom ook grooter dan bij ebstroom en dus eer aanleiding tot loswoeling en medevoering der bodembestanddeelen.

Al deze wisselwerkingen worden nu in hooge mate beheerscht door de

200 dadelijk uitvoerig te behandelen rotatiekracht en de moleculaire schap van zout water om het vormen van een neerslag zeer te bespe digen. Tengevolge van de rotatiekracht dringen de stroomen op het no delijk halfrond naar rechts; in de Nederlandsche riviermonden en zeegan de ebstroom naar den noordelijken, de vloedstroom naar den zuidelijk oever. Het resultaat is, dat beide twee tamelijk scherp gescheiden geul vormen. Dit ingezien zijnde bemerkt men spoedig, dat wijl de vloedstroe op den bodem en de ebstroom aan de oppervlakte aanvangt, de eers voornamelijk in den beginne, dus wanneer de stroom nog niet met groot snelheid loopt en dus aanleiding zou zijn om het meegevoerde zeezan te laten vallen in een eng en nog nauwer wordend bed stroomt en de halve niet alleen geen neerslag vormt, maar daarentegen den bodem aat tast. De ebstroom begint aan het oppervlak, waarschijnlijk iets vroeg aan de noordzijde, maar toch spoedig over de geheele oppervlakte, zo wel der vloed- als der ebgeul. Om beide redenen is dus de ebstroot vooral in den beginne veel minder geschikt verdieping teweeg te brenge Eerst tegen het einde zal de ebstrooming in geringe mate tot het in stat houden der diepte nuttig kunnen zijn. In enge riviermondingen, zoos thans de doorgraving aan den Hoek van Holland, die vrij ver in 21 eindigen in een richting 90° tot 180° afwijkende van de streek, waart de vloedstroom komt zal de direkte werking van dezen laatsten binne gering zijn en hoofdzakelijk zich beperken tot de stroomen, tengevolg der binnenwaarts veroorzaakte ondes de translation en ondes d'oscillation Hier is dus in de monding de werking van het uitstroomende water overheerschend en moet het streven zijn dit in groote hoeveelheid met aanzienlijke snelheid te loozen. Evenwel is ook hier de vloedstrooming in zee een geenszins gering te schatten middel, om de, geheel buiten den mond bezonken, stoffen op te ruimen, mits de directe vloedstroom uit zee maar niet in den mond kome en zoo een binnenondiepte veroorzaken.

Tot nu toe is niet alleen in deze studie maar ook bij de meeste be schouwingen over rivier- of havenmondingen slechts rekening gehouder met de mechanische verschijnselen der stroomingen. De vorming van on diepten (baar, bank) aan de monding van rivieren is uitsluitend uit een hydraulisch oogpunt opgevat. De afzetting van vaste stoffen heeft echter zelfs afgezien der getijstroomen, bij in zee mondende rivieren op gehee andere wijze plaats dan in binnenmeren.

De oorzaak hiervan zetelt in de nog weinig bekende eigenschap va zoutoplossingen om zwevende en opgeloste stoffen uiterst snel te praec piteeren. De eerste wetenschappelijke waarnemingen vinden wij dienaal gande hij W. H. Sidell (Reports on the hydraulics and physics of the Mississippi 1838). Hij merkt op dat zwevende vaste stoffen sneller worden neergeslagen dan uit de vermindering van snelheid zou volgen ("that earthy matter is deposited more suddenly than would be the case if it depended on the check of velocity alone"). Merkwaardiger wijze zijn deze gewichtige waarnemingen steeds over het hoofd gezien, ook bij de Mississippi. Ja zelfs E. L. Corthell, de resident-engineer, bij de uitvoering der mondingverbetering, maakt nergens gewag van dit feit in zijne beschrijving van dit groote werk (The Mississippi Jetties New York 1881).

Geheel onopgemerkt bleef het seit evenwel niet, doch het trok meer de aandacht van zuiver theoretisch standpunt dan met het oog op de praktijk. Zoo vinden wij verschillende proesnemingen van Durham in de Chemical News (1874, 1878), doch het zijn vooral weder de Amerikanen Hunt, Brewer en in den laatsten tijd Barus, welke niet alleen proesnemingen verrichten maar ook het verschijnsel langs chemischen of physischen weg trachten te verklaren en op de gewichtige beteekenis voor landbouw, voor gezondheidstoestanden en voor waterbouwkunde den nadruk leggen 1).

Hier kunnen wij volstaan met de aanduiding van het feit. Carl Barus zegt: "Zouten toegevoegd aan gedistilleerd door fijn verdeelde onoplosbare stoffen in niet te groote hoeveelheid permanent troebel gemaakt water vermeerderen de snelheid van praecipitatie op een duidelijke wijze in vele gevallen zelfs honderdvoudig. In vele gevallen wordt dit door hem quantitatief aangetoond. Een enkel voorbeeld, dat het resultaat is eener proef met grootere zwevende lichaampjes, moge hier aangehaald worden.

Een ondoorzichtig troebel mengsel in een keukenzout oplossing van 0,05 percent, was na 5 uur doorschijnend en na 21 uur helder. De praecipitatie was volledig in minder dan een uur. Hetzelfde mengsel zonder keukenzout wus na 5 uren nog altijd ondoorzichtig, na 69 uren kon een van boven invallende lichtstraal slechts 50 mM. diep er in doordringen.

Terecht zegt dan ook Barus: "De werking van het praecipiteermiddel is duidelijk en plotseling, wanneer de oplossing dik troebel is, ik kan wel zeggen, zoodanig, dat er betrekkelijk groote deeltjes in gesuspendeerd sin. Wanneer de troebelheid gering is en de deeltjes fijn, dan is de neiging van zouten om spoedige praecipitatie te veroorzaken, hoewel duide-

Hunt, Proc. Bost. Soc. Nat. Hist., pag. 802, Febr. 1874.
 Brewer, Mem. Nat. Ac. of Sciences, Vol. II, pag. 165, 1883.
 Barus, Bull. U. St. Geol. Survey, No. 36, 1886.

lijk, niet zoo zichtbaar". Duidelijk blijkt daarbij, dat uiterst geringe hoeveelheden zout reeds voldoende zijn om het verschijnsel teweeg te brengen. Dit laatste is vooral in ons geval met betrekking tot den brakken inhoud onzer zeegaten en riviermonden van belang.

Voor wij echter na zullen gaan, welke nieuwe gezichtspunten de toepassing dezer proefnemingen op de Nederlandsche kustdoorbraken opent, vestigen wij nog de aandacht op een feit, dat echter reeds implicite in de hier boven vermelde werking van het zeewater ligt opgesloten.

De vloedstroom in de openingen voert n. l. minder stoffen in zich mede dan het aftrekkende ebwater. Behalve door grootere klaarheid onderscheidt het eerste zich ook daardoor, dat de meegevoerde stoffen, hoofdzakelijk zand, zich voornamelijk dicht bij den bodem bevinden. Bij ebstroom zal een meer gelijkmatige verspreiding der stoffen (zand en klei) door de geheele vloeistof voorkomen, ja zelfs is het mogelijk wegens het eer indringen van den vloed langs den bodem en het beginnen der ebstrooming langs het oppervlak, dat het bedrag der zwevend gehoudene stoffen naar boven in het water toeneemt.

Bij het begin van den ebstroom in de aan den noordwal gelegen ebgeul worden de stoffen dus op zeker binnenwaarts gelegen punt neergeslagen. Met den duur der eb wordt deze plaats meer en meer zeewaarts verplaatst tengevolge der veranderde ligging van het aanrakingspunt van rivierwater en zeewaater. Op het binnenwaarts gelegen punt, waar het eerst zand en klei werden afgezet, loopt echter met toenemende eb een krachtiger stroom, tevens van steeds minder wordend zoutgehalte. Nu heeft, tegengesteld aan hetgeen men verwachten zou, weer een opname der vooraf gepraecipiteerde stoffen in het water plaats. Dit is vooral opmerkelijk omdat het water, dat nu het bezinksel weder opneemt, rijkelijker met zwevende vaste stoffen is bezwangerd dan dat waaruit het sediment gevormd is. Er heeft dus binnenwaarts, waar korten tijd vooraf een neerslag gevormd werd, thans uitschuring plaats.

Met het aanhouden van de eb neemt aanvankelijk ook de stroomsnelheid toe en hiermede vermeerdert de invloed der naar rechts dringende rotatiekracht.

De ebstroom dringt dus tegen den noordwal aan, langzamerhand spreidt hij zich tengevolge der toenemende breedte uit en komt meer en meer in contact met het zeewater. Om beide reden heeft dus meer buitenwaarts een afzetting van vaste stoffen plaats. Doch ook op deze buitenwaarts gelegen punten heeft ten deele het hier geschetste plaats. Een duidelijk bewijs dezer laatste werking levert het naar het N. W. tegen een plaat, de

Wijnbol, doodloopende Hondegat en een dergelijk kleiner dicht onder den wal van Schouwen bij de Oosterschelde. Nog meer in het oogloopend is het tegenwoordige Nieuwegat, nagenoeg Noord loopende tusschen Voorne en de droogvallende Ribben van den Hinder. De meer noordelijke strekking wijst op een krachtiger stroom rivierwater tijdens eb. Inderdaad leverde deze genl eertijds een bruikbaren vaarweg. Met het afnemende vermogen voor rivierwater van het Haringvliet verzande deze geul meer en meer, zoodat zij thans tegen de Westplaat doodloopt.

Bij het aanhouden der eb zal echter de strooming uit de rivier door de buitengaats loopende ebstroom meer in westelijke richting worden gedrongen en eindelijk zich over de geheele breedte tot den bodem doen gevoelen. Neemt de afvoer van rivierwater in den loop der jaren steeds af, dan verloopen niet alleen de noordwestwaarts strekkende geulen, maar worden de platen aan het land vast en zoo ontstaat een papagaaibekachtige aanwas. Op dergelijke wijze is de Hoek van Holland ontstaan en gedurende deze eeuw openbaart zich deze vorming opnieuw in den Hinder, Banjaard en Oosterzand.

Er is nog een zeer kenmerkend verschil tusschen de platen en ondiepten in en door den ebstroom gevormd en die welke door den vloedstroom teweeg worden gebracht. Is het rivierwater overheerschend dan keeren de droogten hunne convexe zijde naar de ebstroom, soms in een punt hier nitloopend; naar de zeezijde zijn zij daarentegen concaaf en waaiervormig. Is de vloedstroom de voornaamste dan keeren de banken hunne bolle zide naar de zee. Dat geldt zoowel voor afzonderlijke riviermondingen ab voor de verschillende geulen in éénzelfde mond. Het eerste gedeelte dezer stelling is dunkt mij ten volle aanwendbaar, het tweede gedeelte ondergaat voor onze kust, met het oog op de zoo dadelijk te behandeen bassinvorming, eenige wijzigingen. De gedaante, welke op een bezinking in een ebstroom duidt, vertoonen, zooals een blik op de kaart bewijst, alle aan de noordzijde onzer zeegaten gelegene platen en banken. Hier heeft dus verondieping plaats door den ebstroom. Aan de zuidzijde der zeegaten is een diepe, zeewaarts door een korte drempel begrensde en ver binnenwaarts loopende, nagenoeg West-Oost strekkende geul anwezig. Noordwaarts van deze ligt een ten deele aan de zuidzijde conveze plaat. Terwijl het oostelijk einde dezer vloedgeul door eenige snel verschietende ondiepten wordt begrensd, welke gedeeltelijk onderling, soms met de zoo even vermelde plaat nog een flauwe voortzetting der vloedgeul bepalen.

Met betrekking tot den invloed der getijstroomen op de vorming of

instandhouding eener neerzetting staan twee beroemde geophysici Gusta Bisschof en Oscar Peschel lijnrecht tegenover elkaar. Volgens Bisschof (Lehrbuch der chem. und phys. Geologie, II, blz. 1600) zijn "de periodieke stroomen met deltavorming onbestaanbaar, waar deze of ook not male stroomingen plaats hebben kan geen delta ontstaan." Peschel (New Probleme der vergl. Erdkunde, blz. 127 en 139) beweert "dat de delta vorming geheel onafhankelijk is van de getijverschijnselen, dat de spuing der stroommondingen door eb en vloed slechts een beperkte werking heeft en hierdoor de delta-vorming geenszins verhinderd kan worden."

Maar immer is men uitgegaan van de voor de meeste vrij wijde rivier monden onjuiste veronderstelling, dat de vloedstroom stopt en de ebstroom de neergezette zand- en slikdeelen weer zeewaarts voert. Nu voert op on gebroken stranden de zee wel zand aan, doch de vloedstrooming, gehol pen door de rotatiekracht, veroorzaakt afname, terwijl het tweede gedeelte de uitschuring door de ebstroom, slechts waar is in een nauwen tusschel dammen of vaste oevers besloten mond, waar voldoende hoeveelheder rivierwater met zekere snelneid uitstroomen en zeestroomen buitengeslotel zijn. De werking der eb heette immer de voornamere te zijn 1°. omda dan een grootere watermassa doorstroomt, n.l. rivierwater met het inge drongen zeewater, 2°. omdat wegens gedaalden zeespiegel het verva grooter is, 3°. omdat het uitstroomende water geen hindernis ondervindt zooals de instroomende vloed.

En toch is de ebstrooming in de meeste natuurlijke riviermondinger onvoldoende gebleken om den vaarweg of waterafvoer van banken es slikafzettingen vrij te houden. Voor alle riviermonden bevinden zich platen, ondiepten of banken onder den laag waterspiegel, welke, daar zi analoog de echte deltas gevormd zijn, door G. A. Lebour submarim deltas genoemd zijn (On the deposits now forming in the Brit. Seas Geol. Mag. 1875, bl. 476).

Maar immer is vergeten rekening te houden met de rotatiekracht welke afzonderlijke geulen voor eb en vloed het aanzijn schenkt, et eveneens is de vermelde afzetting der stoffen door zeewater over het hooft gezien 1). Als gevolg vinden wij een trechtervormige verwijding van det riviermond.

Het boven en uitstroomende rivierwater spreidt zich meer en meer uit

¹⁾ Toen dit opstel nagenoeg voltooid was, maakten wij kennis met O. Krümmel't Erosion durch Gezeitenströme Petterm. Mitth. Bd. 35, 1889, waarin dezelfde rotatie-kracht voor het eerst bij getijstroomen wordt in rekening gebracht.

en loopt in twee geulen, het binnen en onderstroomende zeewater wordt in één enkele steeds enger wordende geul samengeperst. Daarbij komt aog, dat de oppervlaktestroom der eb wel grooter is dan die van den vloed, doch aan den bodem is de ebsnelheid veel geringer dan de zichtbare en dan de snelheid aan den bodem van den vloedstroom, welke juist onder grootere snelheid bezit dan aan de oppervlakte. De zanddeeltjes, die dus bij eb schijnbaar moeten meegevoerd worden, blijven liggen, die bij vloed oogenschijnlijk niet van hun plaats komen, worden logewoeld.

De kenmerkende trechtervormige verwijding der onder den invloed van getijstroomen ontstane riviermonden is reeds, echter zonder opgave van de boofdreden, door Peschel (Neue Probleme, blz. 128) aangetoond. Volgens hem dringt het soortelijk zwaardere zeewater het rivierwater aan boven, zoodat het wat het aan diepte verliest aan breedte tracht te derwinnen. Bij deze komt nu nog de verwijding ten gevolge der rotatie-dacht.

Tot hiertoe was slechts sprake van riviermond in het algemeen. Carl Sonklar (Allgem. Orographie 1873, blz. 161) onderscheidt echter vier mondingsvormen:

- I. De eenvoudige monding door welke de rivier onverdeeld en zonder verwijding der geul in zee stort.
- 2. Het Aestuarium of negatief Delta, wanneer de mond zich trechterwmig verwijdt, binnen welke rivier en zeewater zich vermengen en welke techter eb en vloed met zee gemeen heeft.
- 3. De haffmonding. De rivier verwijdt zich tot een zoetwaterbekken, betwelk door middel van een doorbraak in de duinen of nehrung met de zee in verband staat.
- 4 De Deltamonding. Wanneer de rivier zich in twee of meer takken in zee stort en zoo een landstreek omsluit, welke den vorm van een Grieksche A heeft.

Rudolf Credner (Petermanns Mittheilungen Erganz. Bd. N°. 56) merkt zer juist op, dat een dergelijke indeeling van een morphologisch standpunt niet voldoen kan, wijl een zelfde riviermond tot verschillende vormen gerekend kan worden. Deze opmerking is allereerst toepasselijk op het gemeenschappelijke mondingsgebied van Rijn, Maas en Schelde, hetwik al naar men wil tot de drie laatste vormen gerekend kan worden. Het ontstaan en de veranderingen van het Nederlandsche alluvium zijn stechts gedurende de laatste vier of zes eeuwen historisch nawijsbaar. De gweldige omwentelingen, welke voor dien de genesis der kustdoorbraken

verduisteren, maken een juiste kennis der voorafgaande toestanden of mogelijk. Slechts stelselmatig geleide grondboringen, zooals thans reed de onderzoekingen van Dr. Seelheim, vermogen hierover meer licht verspreiden. Zoowel uit een genetisch standpunt, doch meer uit ee morphologisch oogpunt komt mij voor het zuidelijk deel der Nederlansche kust een indeeling in zeegaten en riviermondingen, al naarmate cafvoer van rivierwater nihil en gering of groot is, meer rationeel voo Over de laatste is reeds gehandeld; gaan wij thans over tot de zeegate

Wanneer al de waterwegen tusschen de Hollandsche en Zeeuwsch eilanden slechts dienden om bij eb water naar zee, bij vloed water bi nenwaarts door te laten, dan is er geen enkele reden, waarom sommij dezer geulen een zoo geheel afwijkenden vorm en karakter van bove rivieren vertoonen. De tegenstelling tusschen onze kustdoorbraken tree zeer scherp te voorschijn bij het zeegat van Goeree, zooals dit in h begin dezer eeuw zich voordeed, en de Roompot (scherper ware t tegenstelling tusschen de doorgraving van den Hoek van Holland en é Roompot). Bij het eerste, waar destijds de geheele breedte in verhoudin tot het van boven afgevoerde water slechts weinig te groot is gebleker is slechts een trechtervormige verwijding merkbaar. Waar echter de afvo van rivierwater gering en de getijhoogte groot is, treedt de eisch, de het water in zijn heen- en weergaande beweging een weg zal vinden, o den achtergrond. De functie van bassin, dat bij vloed vol, bij eb g deeltelijk leeg loopt, is hier verreweg overheerschend. Uit deze eigenscha van waterreservoir in plaats van watergeleiding volgen van zelf gehe andere hoedanigheden, waaraan deze opening moet voldoen. Laat ons zie welke deze zijn.

Wanneer men een of ander vat in schuinen stand met den boder vooraan in het water dompelt, dan zal, wanneer het laagste deel va den rand even onder water komt, dit laatste tengevolge van zijn arbeid vermogen van plaats met kracht naar den lager gelegen bodem en zijwan stroomen. Bij zekere grootte der opening stroomt echter het water nie over de volle breedte gelijkmatig naar binnen. Aan één der zijden is ee krachtiger stroom binnenwaarts merkbaar dan aan de andere zijde. Deel voor de levende kracht van den stroom is uitgeput, deels waar deze doe den vasten wand wordt tegengehouden, is een neiging tot het vorme van kleine draaikolkjes en tot geheele stroomombuiging merkbaar, welk verhindert, dat het door de overige deelen der breedte in het vat stroc mende water den achterwand of bodem bereikt.

Het schijnt alsof de hoeveelheid van beweging $(m \times v)$ door het wate

opgedaan grooter is dan noodzakelijk om het verste punt van het vat te bereiken en zich nu uitput in het vormen van verschillende neeren of van een groote roteerende beweging der geheele watermassa, zoodat wanseer ten slotte het wateroppervlak binnen en buiten even hoog staat, de watermassa in het vat in draaiende beweging verkeerd. Bij het nemen dezer proef zal men, wanneer het vat een geschikte gedaante heeft en in goeden toestand gehouden wordt bij de eerste pogingen slechts de eindstatie waarnemen. Na eenige pogingen zal men ook de daaraan voorafgande beweging, welke uit den aard van het verschijnsel snel verloopt en dus moeilijk is waar te nemen, ook leeren zien. Het drijven eener danne vettige laag of van stofdeeltjes aan de oppervlakte van het water is het waarnemen dezer stroomingen zeer bevorderlijk.

Last men echter voor de eindrotatie geheel is uitgeput den grooten ink met water plotseling dalen, dan stroomt het water uit het ingedompelde vat naar buiten, en zooals gemakkelijk te voorzien was daar het sent en het snelst, waar de stroom op dat oogenblik buitenwaarts genicht is. Immers daar werkt de levende kracht (of zooals het met een Gemanisme wel eens genoemd wordt: de kinetische energie) in gelijken in als het plotseling verkregen arbeidsvermogen van plaats (de potentitete energie). Daar beide in gelijke richting beweging trachten te vereoraten is de totale energie aan die zijde van het vat krachtiger, waar het water aanvankelijk trager instroomde en nu het eerst uitstroomt. Daar waar echter het water het krachtigst instroomde is de roteerende beweging thans nog binnenwaarts gericht en eerst wanneer de hoeveelheid van beweging dezer naar binnenstroomende massa nul en negatief is geworden kan ook hier uitstrooming beginnen.

Het zal wel reeds duidelijk zijn, dat deze proef eene illustratie beoogt der dagelijks in de Nederlandsche zeegaten zich herhalende getijstrooming. Hij vloed rijst het water buitengaats, dientengevolge, doch voornamelijk gesteund door den krachtigen vloedstroom in zee, stroomt het water koofdzakelijk aan ééne zijde van het zeegat, de zuidzijde naar binnen; voor het nog door het afstroomende rivierwater wordt tegengehouden daait het reeds tegen zon om. Aan de zuidzijde van de zeegaten begint das de vloedstroom eer dan aan den noordelijken oever en op de binnenwaarts gelegen punten aan de noordzijde zal de vloedstroom aanvankelijk een beweging naar buiten kunnen vertoonen, dat wil zeggen, de ebstroom dant hier langer. Twee redenen welke dus de vloedstroom op de zuidzijde eer doen invallen dan aan de noordzijde. De ebstrooming zal daarentegen aan de noordzijde een weinig vroeger beginnen, omdat de hoeveel-

heid van beweging op de ondiepten onder den noordwal eer om gekeerd wordt, maar hoofdzakelijk om de zoo dadelijk te behandeles oorzaak.

Een enkele blik op de configuratie der zuidelijke zeegaten zal een iede duidelijk doen inzien, dat de bovengemelde stroomloop moet plaats heb ben, al is hij voorloopig niet door cijfers te bewijzen. Onmiddelijk bin nen de kustlijn is of de noordelijke of de zuidelijke oever of beide hol alsof de getijstrooming zich hier een kom gedraaid heeft. Men zal da tevens opmerken, dat bij de zuidelijke zeegaten nog twee aanzienlijk factoren een dergelijke rotatie bevorderen. Deze zetelen in de plaat welk in het midden dier zeegaten door die draaiing gevormd is en in de meestal aanzienlijke diepten, welke tegen de oevers, vooral voor der zuidelijken, aanwezig zijn. Daarbij is ook de zuidelijke naar het zeega voerende geul de diepere. Dientengevolge is de massa van het naar binner dringende water grooter dan bij even groote diepte over den geheeles mond; de hoeveelheid van beweging bedraagt dus eveneens meer, waar door bij eb eerst nadat de watermassa aan den noordelijken oever gerui men tijd buitenwaarts stroomt de beweging langs den zuidelijken oeve nul en daarna omgekeerd wordt. Terwijl op de noordelijke zijden bij he vallen van het water de levende kracht van het naar buiten stroomende water, door het afvloeiende rivierwater aanzienlijk vergroot wordt. Einde lijk, evenals bij rijzend water de drooggevallen middenplaat het water eerst langs de oevers dringt, zoo zal bij eb de hoeveelheid van beweging van het water op de plaat wegens geringere diepte minder bedragen en dus spoediger van teeken verwisselen. Het water vloeit dus hier eer weg de plaat is spoedig droog. Tijdens de eb dringt het water dus eveneem naar de geulen en de maximum snelheid zal alleen in deze worden waargenomen.

In het hier geschetste ligt tevens voor een groot deel de verklaring van de zoo menigvuldig genoemde zuigkracht van stroomen.

Zooals reeds gezegd is dit stroomstelsel, welke het zeegat en in geringere mate zeer wijde riviermonden kenmerkt, het duidelijkst zichtbaar, waar de asvoer van rivierwater het geringst is. Als het beste type zal dus wel de Ooster Schelde kunnen dienen. Welke is hier de toestand? Aan de zuidzijde bevindt zich de Roompot, een zeer diepe en machtige geul zonder een enkele bank, waarin tot 40 M. en meer gepeild wordt. Een oever, de Noord-Bevelandsche, berucht door zijne vallen, de westelijke punt van Noord-Beveland steeds aanslibbend, waardoor de capaciteit van het Veergat beperkt wordt en de stroom meer in de Ooster-Schelde ge-

drongen wordt, zoodat het meest bedreigde punt (de Vliete polder) meer hinnenwaarts ligt. Aan de overzijde ligt een in den loop der eeuwen gebeel uitgeholde oever, welke oogenblikkelijk de aandacht trekt. Onder den wal van Schouwen een diepe geul de Hamme, doch zoowel in breedte sk in diepte aanzienlijk minder dan de Roompot; meer zeewaarts het Westgat nagenoeg evenwijdig aan den Roompot, terwijl een smallere geul het Hondengat in noord-noordwestelijke richting de zee niet kan bereimaar tegen de bank de Wijnbol doodloopt en een nog smallere toch 200 8 M. diepe geul direkt tegen de kust van Schouwen. Tusschen Noordbeveland en Schouwen een groote plaat gevormd door Neeltje Jans- en Roggeplaat. De zuidelijke oever dezer platen, stijl afvallende en meer en neer in een oever overgaande, wijst daarop dat de vloed hier zand afzet. e geulen tusschen de platen zooals het Kaarsboergat in de richting van agtsluis naar de Hamme afdalende, er op wijzende, dat de eb in deze khting aftrekt, terwijl de Pijp tusschen Neeltje Jans- en Roggeplaat thans mr het zuiden doodloopt.

Meer binnenwaarts liggen verschillende bulten, samen de Vuilbaard uitnkende, die bij Colijnsplaat ten deele aan den vasten wal verbonden
n voordurend in beweging zijn. Zij vormen dus een barrière voor den
komenden vloedstroom, welke hier de Noordbevelandsche wal verlaat,
n andere belemmeren zij ook het uit de Keeten afstroomende ebwater,
n echter in hoofdzaak bij het havenhoofd van Zierikzee rechts om de
samme invloeit. Zeewaarts van de Neeltje Jansplaat een langwerpige sterk
n beweging zijnde plaat, de Middelplaat, en eindelijk nog meer buitenaats tusschen de reeds genoemde geulen verschillende zich zeewaarts
naiervormig uitbreidende platen en banken, samen de Banjaard vorende (zie de Beschrijving der Nederl. zeegaten, Dl II, uitgegeven op
at van het Ministerie van Marine, door C. J. de Jong Pzn., chef H. A.
le Smit v. d. Broecke, Kapt. Luit. ter Zee, blz. 15 en vlg.).

Keeren wij na deze kleine uitwijding van een bepaald geval tot den gemeenen toestand terug, dan rijst de vraag: stroomt werkelijk op de idzijde der zeegaten en riviermonden het water eer naar binnen dan de noordzijde. De kustvorm duidt op dezen stroomloop, doch gerede waarnemingen zijn, zoover mij bekend, niet aanwezig. Toch kan voldoende blijken uit de "Beschrijvingen der zeegaten". Trouwens is algemeen bekend dat het vaarwater in de zeegaten steeds tegen de id ligt, zoo Wielingen, Roompot, Brouwershavensche Gat en Slijkgat, de schepen tusschen ZW. en W. der zeegaten blijven om met den vloed vengaats te zijn en zoo naar binnen te komen.

Men kan echter vragen is er eenige aannemelijke reden voor het ve schijnsel op te geven. Deze nu bestaat.

Zooals bekend is slingert de vloedgolf, van de Belgische kust komend in noordwestelijke richting voor de zuidelijke eilanden voorbij. Daar is de voortplantingssnelheid van de vloedgolf evenredig is met de vierkant wortel uit de waterdiepte, zal zij in het diepere water b. v. de Roompo sneller voorwaarts rukken en dus reeds aanmerkelijk diep zijn ingedroegen voor de golf ondiepten als de Hompels en de Noordland overwonnt hebbende, de Hamme kan intrekken. Daarbij komt nog dat de snelhei van den getijstroom evenredig is aan het verschil tusschen H. en L. V hetwelk toenemende is, naarmate men langs de Nederlandsche kust zuiwaarts gaat.

Er is echter nog een andere gewichtiger reden voor dat rechts indrigen van den vloedstroom. Deze oorzaak zetelende in de traagheid de lichamen is, wijl zij ook op andere wijze dan door den vloedstroom of zen kustvorm bepaald, belangrijk genoeg om er eenigszins uitvoerig b stil te staan.

Een kogel aan den evenaar in de richting van den meridiaan afgescheten, zoo leerde men, zou op het noorder halfrond, wanneer zijne beweging niet door den wederstand van de lucht uitgeput raakte, steeds bove meer oostelijk gelegene meridianen komen, omdat de aarde onder het door draait. De schijnbare baan zou dus uit Z. W. gericht zijn en de kegel een afwijking naar rechts uit zijne oorspronkelijke richting ondergaat Eenzelfde afwijking naar rechts zou bij tegengestelde richting plaats gripen, terwijl op het zuidelijk halfrond de afwijking tegengesteld zou zijt Bij iedere niet juist in de richting van den meridiaan vallende beginsne heid moest de afwijking minder bedragen en de oorzaak was bij ieder beweging in de richting der parallelen geheel afwezig.

Het is de onsterfelijke verdienste van den Amerikaanschen meteoroloo W. Ferrel, deze geheel foutieve verklaring door de juiste, op wiskundig gronden berustende, vervangen te hebben. Op zijne verklaring der relatieve beweging op de draaiende bolvormige aarde, berust de windwet waaraan de moderne meteorologie haren grooten voortgang der later jaren dankt.

Zijn

- X, Y en Z drie onderling rechthoekige coördinaten, achtereenvolgen Zuid, Oost en zenithwaarts gericht.
- x, y en z de relatieve snelheden, respectivelijk in deze drie richtingen.

De absolute beweging op de in rust verkeerende aarde, volgens vaste coordinaten, wordt dan uitgedrukt door de bekende vergelijkingen

$$-\frac{d p}{\varrho d X} = \frac{d x}{d t} + F_z; -\frac{d p}{\varrho d Y} = \frac{d y}{d t} + F_y; -\frac{d p}{\varrho d Z} = \frac{d z}{d t} + F_z + \varepsilon$$

waarin partieele differentiaalquotiënten, respectievelijk met betrekking tot de drie coördinaten, bedoeld zijn.

Wanneer de aarde niet in rust is, maar om hare as draait, zijn de coordinaten X, Y en Z niet meer vast in de ruimte, de snelheden x, y en z zijn geen absolute snelheden meer, maar relatieve met betrekking at het bewegende coordinatenstelsel.

Om dus de vergelijkingen nog te kunnen toepassen, moeten termen, voortvloeiende uit de aswenteling der aarde, worden toegevoegd.

Zü

r = de straal der bolvormig gedachte aarde,

 θ = het complement der geogr. breedte,

n = de rotatiesnelheid op de eenheid van afstand,

= de relatieve hoeksnelheid oostwaarts,

e = de straal eens breedtecirkels,

dan is $\varrho = r \sin \theta$ en $y = r \varrho = r r \sin \theta$.

Ten gevolge der aswenteling is de middelpuntvliedende kracht voor de eenheid van massa in de richting van $\varrho \ \varrho \ (n+\nu)^2$, waarin $n+\nu$ de totale hoeksnelheid is, voortvloeiende uit de draaiing der aarde n en de relatieve hoeksnelheid oostwaarts ν . De ontbondene dezer kracht, in de richting van den aardstraal r en loodrecht hierop in het vlak van den meridiaan, zijn:

$$\varrho(n+\nu)^2 \sin\theta = \varrho n^2 \sin\theta + (2n+\nu) \nu \sin\theta (1)$$

$$\varrho(n+\nu)^2\cos\theta = \varrho n^2\cos\theta + (2n+\nu)y\cos\theta (2)$$

De beide eerste termen, in de tweede leden dezer vergelijkingen, zijn onafhankelijk van v en hebben dus geen invloed op de relatieve beweging met betrekking tot de draaiende aarde. De eerste term, ϱ $n^2 \sin \theta$, duidt den invloed der rotatie op de aantrekkingskracht der aarde aan. Deze kracht veroorzaakt een geringe vermindering der zwaartekracht. In maximum aan den evenaar, bedraagt deze kracht ϱ $n^2 = \frac{1}{185}$ der aantrekkingskracht. De tweede term, ϱ $n^2 \cos \theta$, in den meridiaan gericht maximum evenaar, veroorzaakt een geringe verandering in de richting der

aantrekkingskracht, zoodat deze niet meer naar het middelpunt der aarde is gericht. Hij bepaalt de ellipsoidale vorm der aarde.

De tweede term in (1), (2n+v) y sin θ , brengt, zoo y positief is, een kleine vermindering, zoo y negatief is, een kleine vermeerdering det zwaartekracht te weeg. Maar deze geheele term is zeer klein ten opzichte van den eersten, die reeds zeer gering is ten opzichte van de zwaartekracht. Hij kan dus veilig verwaarloosd worden.

De tweede term in (2), hoewel van dezelfde orde als die in (1), is echter belangrijk, wijl het een horizontale kracht is, die, hoewel gering in verhouding tot y, groot kan zijn met betrekking tot de in horizontale richting werkende krachten. Deze term moet dus gevoegd worden bij het eerste lid der eerste van de drie grondvergelijkingen.

De tweede wet van Kepler, welke in zijn algemeenen vorm uitdrukt, dat bij iedere centripetale of centrifugale kracht de radiusvector in gelijke tijden gelijke vlakteinhouden doorloopt, levert hier de vergelijking

$$\varrho^2(n+r) = r^2 \sin^2 \theta (n+r) = \text{constant}$$

welke ten opzichte van t gedifferentieerd

Differentiatie met y en θ als onafhankelijk veranderlijken van $r = \frac{y}{r \sin \theta}$ geeft

$$dv = \frac{\sin\theta \, dy - y \cos\theta \, d\theta}{r \sin^2\theta}$$

tevens is

$$\frac{y\cos\theta}{x\,n\,\theta} = r\,r\cos\theta \text{ en } r\,d\,\theta = x\,d\,t.$$

Met behulp dezer laatste drie vergelijkingen wordt (3)

$$-\cos\theta (2 n + \nu) x = \frac{dy}{dt}$$

De poolwaarts gerichte bewegingscomponente, geest dus aanleiding tot een' versnelling in de richting des breedtecirkels. Met dezen term moet dus de tweede der drie oorspronkelijke vergelijkingen vermeerderd worden, om de bewegingsvergelijkingen met betrekking tot de draaiende aarde te verkrijgen. Deze zijn dus

$$-\frac{dp}{q dX} = -\cos\theta (2n+r)y + \frac{dx}{dt} + F_z$$

$$-\frac{dp}{q dY} = +\cos\theta (2n+r)x + \frac{dy}{dt} + F_y$$

$$-\frac{dp}{q dZ} = \varepsilon + \frac{dz}{dt} + F_z$$

Het meest eenvoudige geval doet zich voor bij horizontale beweging, wanneer de wrijving verwaarloosd kan worden

$$o = -\cos\theta \left(2n + r\right)y + \frac{dx}{dt} \quad o = \cos\theta \left(2n + r\right)x + \frac{dy}{dt}$$

Is de relatieve snelheid zeer klein ten opzichte der rotatiesnelheid, dan is

$$\frac{dx}{dt} = 2 n y \cos \theta \qquad \frac{dy}{dt} = -2 n x \cos \theta$$

De versnellingen, m. a. w. de Oost en West gerichte krachten per eenheid van massa, geven samen een resultante F, welke de afwijkende kracht, ten gevolge der aardrotatie, voorstelt. Zij s eveneens de resulteerende van x en y; φ en φ' respectievelijk het azimuth van F en s dan is

$$F = \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} = 2 n s \cos \theta$$

en

$$tg \varphi' = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = -\frac{x}{y} = -\frac{\cos \varphi}{\sin \varphi} = -\cos \varphi$$
$$\varphi - \varphi' = 90^{\circ}$$

of

Bij gevolg is er een kracht aanwezig, welke loodrecht op de bewegingsrichting op het noordelijk halfrond een afwijking naar rechts tracht te veroorzaken. Op het zuidelijk halfrond is $\cos \theta$ negatief, de afwijkende kracht dus in tegengestelde richting.

Overal op de bolvormige, draaiende aarde is dus een kracht aanwezig, welke onafhankelijk van het azimuth der beweging, doch afhankelijk van de geographische breedte een afwijking naar rechts (noordelijk) of naar links (zuidelijk halfrond) teweeg brengt. Slechts op den evenaar, waar $\cos\theta = o$ is, verdwijnt deze kracht. Ook deze kracht is evenals de centrifugale kracht, geen werkelijk bestaande kracht, maar slechts een gevolg der inertie.

Het scheen mij wenschelijk eenigszins uitvoerig bij deze beschouwingen stil te staan, 1° wegens hunne belangrijkheid ipso facto en de minder algemeene bekendheid; 2° wegens de gewichtige gevolgen, welke uit deze beweging en traagheidsbaan op aarde voortvloeien met betrekking tot de getijstroomen langs de Nederlandsche kust en binnen de zeegaten 1).

¹⁾ Zie ook Report Chief Signal Officer 1885. Een uitvoeriger eleganter doch minder elementair bewijs kan men vinden in: The Motions of Fluids and Solids on the earths sarface by W. Ferrel en in Sprung's Lehrbuch der Meteorologie.

Deze neiging van het water om tengevolge der aswenteling van de aarde in een traagheidsbaan te loopen, welker holle zijde voor de Nederlandsche kust landwaarts is gekeerd, maakt dat de vloedstroom als 't ware steeds op de kust aan loopt, behalve nog andere oorzaken, die hetzelfde teweeg brengen. Dientengevolge wordt de kust afgeschuurd en langzamerhand hol naar zee; daar waar het zeewater naar binnen kan vloeien en dus voor een deel gevolg geven aan de neiging om in traagheidsbaan te vloeien, is in den loop der eeuwen een afronding der vooruitspringende hoeken tot stand gekomen. Hierdoor is de opmerkelijke overeenkomst der bolle noordzijden van de zuidelijke eilanden te verklaren. Eenzelfde werking, doch in mindere mate, komt het afloopende rivierwater bij eb toe. Eindelijk, in nauwe vaarwaters, wordt hoofdzakelijk de onderzeesche oever aangetast, voegt men nu hierbij dat deze grond minder weerstand biedt dan de bovenliggende klei, zoo geeft dit een machtige factor tot oever- en dijkvallen.

Wat is n. l. het gevolg van deze neiging tot het vloeien in traagheidsbaan of korter dezer rotatiekracht? In de eerste plaats eene afwijking der loodlijn. De verhouding tusschen de afwijking veroorzakende kracht en de zwaartekracht geeft de tangens van de afwijkingshoek uit de loodlijn

$$\frac{\mathbf{F}}{g} = \frac{2 n}{g} s \cos \theta$$

waarin $\frac{2n}{g}$ = 0,00001487 indien s in M p. sec. wordt uitgedrukt.

De breuk $\frac{\mathbf{F}}{g}$ drukt tevens uit de verhouding tusschen de zijdelingsche druk en het gewicht van het lichaam of de vloeistof-massa, welke waar en in welke richting ook op aarde gedwongen wordt zich in een rechte lijn te bewegen. Het water staat dus in den stroom rechts hooger dan links.

De rotatiekracht, welke evenredig is aan de snelheid en de geographische breedte, tracht het lichaam of de vloeistof naar rechts te doen uitwijken, zoolang totdat de beweging geschiedt in zekere kromme, de traagheidsbaan, welke bereikt is wanneer de dientengevolge ontstane centrifugale kracht evenwicht maakt met de rotatiekracht.

Zij $\varrho =$ kromtestraal der traagheidsbaan

 $\varphi =$ hoeksnelheid van ϱ

dan is de centrifugale kracht voor de eenheid van massa $\varrho \varphi^2$ en

$$\varrho \varphi^2 = 2 n s \cos \theta$$
 $\varphi \varrho = s$

waaruit φ en q voor ieder gegeven geval kunnen gevonden worden. Bij

benadering θ constant aannemende beweegt zich de vloeistof in een cirkel. Uit de bovenstaande beschouwingen volgen drie vraagstukken:

- r°. Hoeveel hooger staat het water aan de rechterzijde van een stroomloop, welke op gegeven geographische breedte met bekende snelheid en breedte water afvoert in een rechte lijn?
 - 2°. Hoe groot is de druk naar rechts?
- 3°. Welke kromtestraal moet die rivier of stroomloop hebben, opdat het oppervlak zich horizontaal stelt?

Hopende dat de toekomst voldoende gegevens zal verschaffen met betrekking tot de thans zoo schaars bekende stroomsnelheden, kunnen wij de behandeling dezer vraagstukken tot later uitstellen en nader den invloed dezer rotatiekracht op de stroomen en dus op het grondtransport tengevolge dezer nagaan.

Gaan wij daarbij uit van de waargenomen feiten met betrekking tot de verplaatsing der in fijnverdeelden toestand aanwezige slik of zanddeeltjes, dan valt in de eerste plaats de voortdurende beweeglijkheid der stranden kustvormen op, naast de — afgezien der door catastrophen veroorzaakte plotselinge omkeeringen — groote stabiliteit der hoofdlijnen. Na iederen vloed, wanneer het water aftrekt, komt het strand weer maagdelijk te voorschijn. Welke afval, zooals door opeenhooping van menschen aan badplaatsen, of indrukken zooals door kinderen gegraven kuilen en opgeworpen hoogten ook aanwezig waren, het vloedwater maakt tabula rasa. Schoon en gelijkvloeiend als voorheen duikt het strand bij iedere eb omhoog.

Bij langduriger waarneming valt echter spoedig naast deze nivelleerende werking een ander gevolg van het verplaatsen der zanddeeltjes in het oog.

Kleine geulen en ruggen nemen na enkele weken elkaars plaats in. Naast deze voortdurend verloopende kleine veranderingen voor een deel door branding en golfslag, voor een ander deel door de stroomingen te weeg gebracht, merken wij, afgezien altijd van de groote veranderingen bij stormvloeden, een bijna absolute onveranderlijkheid in vorm van het grootste gedeelte der kust op. Dit behoud der hoofdlijnen gaat langs de Nederlandsche kust grootendeels gepaard met een voortdurende daling of verplaatsing landwaarts der strandlijn.

In tegenoverstelling met deze slechts langzaam werkende plaatsverandering of standvastigheid der lijnen vallen andere kustgedeelten in het oog, waar een uiterst snel transport der zanddeeltjes plaats heeft, welke op sommige plaatsen tot krachtige vorming van platen of banken ôf tot mellen aanwas van slikken of gorzen op andere oevergedeelten daarente-

gen een opruiming van banken en een sterke afname der oevers, hetzij geleidelijk, hetzij plotseling aanleiding geeft.

In beide gevallen, hetzij verlies hetzij winst plaats grijpt, heeft aan de Nederlandsche kust grondtransport plaats. De voortdurende verandering van het oppervlak, zooals door het uitwisschen van indrukken bewezen wordt, geven dit onomstootelijk te kennen. Het is duidelijk, dat deze opruiming en gladmaking grootendeels toe te schrijven is aan den stroom en de door het water drijvend gehouden wordende massa zanddeeltjes, onverschillig in welke richting deze vliet.

Daar waar de kustlijn onveranderd op dezelfde plaats blijft, moet deze zandstroom quantitatief onveranderd over trekken. Deze eenparige beweging sluit echter het vormen van een neerslag niet uit.

Men heeft het zich zoo voor te stellen als of even veel zand wordt meegevoerd als neergeslagen en dit is binnen niet al te lange tijdperken in hoofdzaak langs de Nederlandsche kust het geval.

Wanneer wij echter rekening houden met den toestand van voor eeuwen, dan valt afgezien van een langzame daling, een achteruitgang van de strandlijn te constateeren. Welke geologische invloeden hierbij in werking zijn, ligt buiten onze beschouwing doch een niet te veronachtzame factor zetelt in den vloedstroom geholpen door de rotatiekracht en de meest heerschende ZW. winden. Wordt het water gedwongen langs een rechten of hollen oever te stroomen dan moet de neiging tot het vloeien in de traagheids baan een voortdurenden aanval en dientengevolge uitholling na zich sleepen. Het aldus meegevoerde zand moet op andere kustvakken, waar de stroomsnelheid om andere redenen b. v. de geringere vloedhoogte of meerdere ruimte geringer is, worden neergezet.

Geheel anders is de toestand bij de zuidelijke zeegaten. Deze geven den vloedstroom gelegendheid aan de werking der rotatiekracht gevolg te geven. Daardoor zal de bij stormvloed veroorzaakte doorbraak in den strandwal aan de zuidzijde meer en meer verruimen en het strand daar een zekere afronding bekomen. Maar tevens, omdat hier de vloedstroom vrijelijk naar binnen kan stroomen, wordt de tegenoverliggende oever van het gat ontzet. Jazelfs moet een gedeelte der aan de zuidelijke oever opgenomen stoffen hier neergezet worden. Hierbij komt nu nog de werking der van de bovenrivier meegevoerde stoffen. De ebstroom tracht hier wel is waar eveneens een afronding te weeg te brengen; hare werking is in den loop der eeuwen langs de Nederlandsche kust echter onvoldoende gebleken. Jazelfs daar waar eenmaal een vrije mond bestond, zooals voor de Nieuwe Maas op de kaart van Cruquius 1733 uit den oever

van 1606 door Matthijs de Been van Wena opgenomen blijkt, is de ebstroom niet bij machte gebleken dezen in stand te houden.

De afronding van den zuidelijken oever houdt zoo lang aan tot het kastvak daar ongeveer het beloop der traagheidskromme, in verband met andere factoren, zooals de weerstand der gronden, bezit. Is plaatselijk de kromming binnenwaarts sterker dan de vereischte, dan heeft opslibbing en aanzanding plaats zooals Breezand en Onrust aan den Roompot bewijzen.

Wordt zooals meer binnenwaarts het bed vernauwd dan heeft stroom versnelling plaats en worden dus nog meer stoffen meegevoerd. Komt ook daar het beloop der oeverlijn niet met de traagheidskromme overeen dan heeft zijdelingsche druk plaats, dus rechtstreeksche aanval van den oever. In nog grooter mate is dit het geval wanneer de stroom op den oever loopt, zooals o. a. voor de N. Bevelandsche wal uit de "Noordzee waarnemingen" blijkt. Is nu de ondergrond, zooals de tertiaire leem in Zeeland, minder samenhangend dan de daarop drukkende meer compacte zeeklei dan zijn dijkvallen het noodwendig gevolg. De dien tengevolge in de stroomgeul gezonken gronden worden zeer spoedig opgeruimd, omdat de bodemsnelheid door de naar binnen toenemende zijdelingsche vernauwing van het bed nog grooter is dan voor de reeds meegevoerde zeezanddeelen noodzakelijk is. Een gedeelte dezer stoffen wordt echter naar het midden van het komvormige zeegat gevoerd.

Wanneer n.l. het water gedwongen wordt te stroomen, hetzij in rechte lin, hetzij in een bocht van geringere kromming dan de traagheidsbaan, wordt het tengevolge der zijdelingsche druk diep tusschen de zanddeeltjes van den rechter oever gedrongen, maar bovendien staat het aan den rechteroever hooger dan aan den linker en er zal dus op den bodem een bodrecht op den stroom gerichte beweging ontstaan, welke het opperweder horizontaal tracht te maken en deze zet zand naar het midden af. De vloedstroom eindelijk stuitende tegen het rivier of binnenwater, verliest grootendeels zijne snelheid en vormt hier een binnenbank. Voor bij echter dit uiterste punt bereikt, wijkt het water tengevolge der lereade kracht naar links en vormt een of meer kolken of wielen. Evenals nu op een bovenrivier in een bocht kort achter den bollen oever, tengevolge der naar het middelpunt afnemende snelheid, zand wordt régezet, zoo wordt in het zeegat de snelheid naar het midden geringer de aanwas der plaat bevorderd. Ook op bochten in bovenrivieren best een dergelijke werking als de zoo even beschrevene plaats, welke woonlijk over het hoofd gezien wordt. Tengevolge der centrifugale kracht in de rivierkromming stijgt het water aan de buitenzijde der kromming omhoog en dit veroorzaakt een dwars gerichten stroom aan den bodem van het door de wrijving vertraagde water naar het middelpunt Het voorafgaande kunnen wij als volgt samenvatten.

Er is een zekere kracht, rotatiekracht, tengevolge der aswenteling der aarde die bewegende watermassaas, hetzij zeestroomen of rivieren naar rechts dringt. Een rivierbed, *ceteris paribus*, zal dus nimmer, zonder van buiten werkende oorzaken, zich naar links wenden. De riviermond op zich zelf heeft dus aan de Nederlandsche kust een richting naar N.W.

De uit het Zuiden langs de Nederlandsche kust strijkende vloedstroom in de riviermonden of kust-doorbraken indringende, draait tengevolge der rotatiekracht naar rechts en bewerkt in den loop der eeuwen een afronding van den zuidelijken oever.

Op gelijke wijze tracht het uitstroomende rivierwater bij afloopende eb den noordelijken oever af te ronden. De aanwezigheid van twee geulen een vloedgeul in het zuidelijk en een ebgeul in het noordelijk deel is van deze rotatiekracht het gevolg. Het ingedrongen vloedwater door het rivierwater tegengehouden laat het meegevoerde zand vallen en vormt binnen een ondiepte, soms verbonden aan den zuidelijken oever. Het afloopende rivierwater door het zwaardere zeewater wigvormig omhoog gedrongen zoekt in uitspreiding het verminderde profil door verlies aan diepte te hetstellen, vloeit daardoor langzamer en laat dientengevolge het meegevoerde zand buitengaats op de overblijfselen van den vroegeren strandwal vallen.

De afzetting van vaste stoffen in den ebstroom en in mindere mate ook die in den vloedstroom wordt behalve door het arbeidsvermogen der bewegende watermassa in hooge mate beheerscht door de moleculaire (hetzij chemische, hetzij physische) eigenschap van zeewater, welke een uiterst snelle sedimentvorming te weeg brengt.

Is de kromming van den zuidelijken oever niet overeenkomende met de snelheid van den vloedstroom en vindt deze ook geene zijdelingsche afleiding naar rechts, dan zullen dijkvallen en oever afname het gevolg zijn. Onder overeenkomstige omstandigheden heeft hetzelfde plaats aan den noordelijken oever. Ieder dezer oorzaken afzonderlijk of beide te zamen verwijden het zeegat in aanzienlijke mate en vooral binnengaats, wijl de alluviale bezinkingen spoediger bezwijken dan de zandige strandwal. De vloedstroom, in deze kolk binnenstortende, wordt behalve door het binnenwater ook door de zelf opgeworpen baar tegengehouden en wijkt uit naar de zijde van den geringsten weerstand d. i. naar links. Langzamerhand schuurt de vloedstroom achter den kop van de binnen-

bandre een geul. In deze kolk ontwikkelt zich meer en meer de voorafbeschreven stroomloop; het water vormt een wiel of wieling, welke een voorddurende aanwas en afronding der langzamerhand afzonderlijk liggende middenplaat tengevolge heeft, voornamelijk ten koste van den zuidelijken door den vloedstroom afgebrokkelden oever.

Hoewel zulks een studie is op geheel ander gebied, hebben wij gemeend eenige bewijzen voor den hier geschetsten stroomloop uit de geschiedenis te moeten aanvoeren. Het is immers duidelijk dat, alhoewel de oevers en stranden den loop der rivieren en zeestroomen bepalen, deze beide laatste kust en banken in den loop der eeuwen naar hunne wetten vervormd hebben, zelfs daar waar onophoudelijk de mensch met onwetende hand in den natuurlijken loop heeft ingegrepen.

Het derde bewijs, immers in de eerste plaats staat den beschreven stroomloop mathematisch zeker, kan geleverd worden èn door het expenment èn door een beredeneerd onderzoek der bestaande toestanden, welke beiden buiten het bereik van een enkelen persoon liggen.

Met betrekking tot de alleroudste toestanden langs deze kusten zijn sechts enkele min of meer aannemelijke hypothesen op te stellen. Vrij algemeen wordt aangenomen, dat lang vóór de christelijke jaartelling Groot-Brittannië aan het Europeesch vasteland verbonden was. De overenkomst in geologie en morphologie der beide kanaalkusten kan hiervoor pleiten. Sommigen nemen aan, dat destijds de Nederlandsche kust zich tot over de Breeveertien uitstrekte; ja! er zijn er, die beweren, dat Engeland van de hoogste Nederlandsche duinen af zichtbaar was (Mr. H. v. Wijn in zijn Bijvoegselen op Wagenaars Geschiedenis des Vastelands, Scheltema, Geschied. en Letterk. Mengelwerk). Hoewel het historisch boven iederen twijfel verheven is, dat de Nederlandsche kust in de batste eeuwen achteruitgaande is, zoo zijn toch ontegenstrijdig genoemde verhalen geheel naar het rijk der fabelen te verbannen. Was echter het nauw van Calais gesloten, dan is het hoogst waarschijnlijk, dat de Noordæ, eindigende in een gesloten trechter, aanleiding gegeven moet hebben tot zeer hoog oploopende vloeden en laagvallende ebben, zooals thans nog o.a. het geval is in de Fundy-baai in N. Amerika.

Sir William Thomson (Rep. Brit. Ass. 1875, p. 639) meent, dat een stuing van de straat van Dover geen verandering te weeg zou brengen in de thans bestaande getijstroomen in de Noordzee. Evenwel is zijne latere uitspraak (Nature 1879, p. 571, R. Soc. March 17) dat vortex metion tengevolge der rotatie van de aarde de getijstroomen beheerscht, hermede in strijd.

Het is immers duidelijk, dat de in de voorafgaande bladzijden behandelde rotatiekracht bij een gesloten straat van Dover de dan geheel uit het noorden komende vloedstroom naar de Britsche kust zal dringen en de Nederlandsche ontlasten.

Hoe het ook zij, de enorme periodieke vloedgolven mogen ten slotte de gemakkelijk vernielbare krijtbarrière in straat Dover verbroken hebben en zoo deed de vloedgolf komende uit het Kanaal zijn intrede in de Noordzee.

Men is gewoon de Nederlandsche kust in die alleroudste tijden zich voor te stellen als een landtong of strandwal van door de zee opgeworpen duinen. Hierachter bevond zich, altijd volgens hypothese, een haff, waarin de Rijn, de Maas en de Schelde uitmondden. De door deze rivieren meegevoerde verweringsproducten en organische resten vormden in verband met den zich in dit haff ontwikkelenden plantengroei, langzamerhand verschillende delta's, niet in de morphologische beteekenis eener Grieksche Δ , maar in het genetische begrip van alluvialen aanwas.

Langzamerhand schuiven deze delta's voorwaarts.

Aan de uiterste grenzen zijn slikbanken, op het vroeger gevormde reeds moerassen met plantengroei, welke door periodieke overstroomingen, hetzij van hoog opperwater, hetzij door de getijen afwisselend droogloopen en overstroomd worden. Door den onophoudelijken aandrang der zee, die bij stormvloeden met krachtigen golfslag zich eindelijk doortochten in de strandbarrière wist te slaan, werden talrijke stukken van dit delta, welke nauwelijks boven water lagen en hetzij open, hetzij zooals later door dijken beschermd waren, weggeslagen. Ondanks deze verliezen staat de deltavorming geenszins stil, zoowel daar waar de riviermonden zich bevinden als kort achter de stand gehouden hebbende stukken van den strandwal, gaat de aanwas voort, zooals nog heden ten dage voor de noordelijke eilanden het geval is en uit de inpolderingsjaartallen op de Zuid-Hollandsche eilanden blijken kan.

Terwijl het delta voorwaarts rukt, verhoogt zich ook de rivierbodem. Immers de rivier wordt verlengd door den aanwas van het delta, het verval dus geringer en daarmee vermindert tevens de stroomsnelheid en dus de hoeveelheid van beweging, welke de stoffen meevoert, zoodat meer en grootere stoffen bezinken. Herhaalde zijdelingsche overstroomingen zijn hiervan het gevolg en het rivierwater zich dan tusschen riet en struikgewas over groote oppervlakte verspreidend, verhoogt het delta. Onder gewone omstandigheden wordt echter de stroom in steeds enger wordende geulen gedrongen, in welke kleine banken plaatselijk opnieuw vernauwing

twee brengen. Door dit samenpersen van het water wordt echter de heveelheid van beweging in de geulen weer vergroot, de verweringsproducten dus verder meegevoerd en zoo een snellere aanwas op de uiteinden verkregen. Het zeewater, dat bij vloed op de banken staat, vormt bij het asloopen geulen, welke bij zijdelingsche asvloeiing van het rivierwater, tengevolge van doorbraak der oevers een weg vormen voor het bij eb strekkende water, in welken de stroom minder weerstand kan ondervinden dan in zijn eigen bed, waardoor een geheele verlegging van de onderscheiden riviermonden het gevolg kan zijn. Ook kunnen enkele mondingen geheel verstopt raken met sedimenten of door het uit zee gedrongen sand, waardoor het aantal passen zeer verminderd kan worden.

Door deze wisselwerkingen werd het Nederlandsche haff meer en meer strukt en daar de voorliggende duinenreeks de verschillende delta's meer na meer tot uitbreiding in de breedte noodzaakte, had langzamerhand een verschillende delta's plaats, terwijl de later volgende doorbraken in den strandwal door vorming van geheel nieuwe genlen, de scheiding meer en meer onzichtbaar maakte en grootendeels sen geheel nieuw net van kanalen schiep, uit welks morphologischen kouw slechts weinig met betrekking tot de oorspronkelijke delta's valt besluiten.

Het microscopisch en scheikundig onderzoek der door systematische mondboringen omhoog gehaalde bestanddeelen van den Nederlandschen odem is het middel om aan het licht te brengen, welk aandeel ieder drie rivieren Rijn, Maas en Schelde aan zijne vorming gehad hebben. In hoofdzaak zullen het de door de rivieren mechanisch meegevoerde coffen zijn, welke bezonken tot de vorming van het delta aanleiding geeven hebben, daarnaast komen de in opgelosten toestand meegevoerde mineralen in aanmerking, welke vooral als bindmiddelen tusschen de gerecipiteerde stoffen de noodige vastheid aan het geheel verleend hebben. Zindelijk heeft de op het delta zich ontwikkelende plantengroei in hoofdmak aanleiding gegeven tot de organische resten, welke, voor zoover zij ich op het door getijen overstroomde land gevormd heeft, of door klining of door daling van den bodem onder water geraakt is, als skelet voor nieuwe door den stroom afgevoerde en bezinkende stoffen gewerkt cest. Terwijl door den druk dezer nieuwe bovenliggende lagen de klining toenemend en de vastheid vergroot wordt. In kleinere mate zullen reekdierschalen, foraminifeeren en skeletten van gewervelde dieren deel imaken van de organische resten.

Het 200 evengenoemde onderzoek door grondboringen is vooral met

het oog op de bizondere verschijnselen, welke zich in de verschillend deelen van Nederland voordoen, zooals oevervallen in Zeeland van zee veel gewicht. Hoe ouder de deltavorming is, des te vaster zal zij zijt door langdurigen grooteren druk; afwezigheid van minerale bindmiddeles of van als ankers werkende overblijfselen der voormalige plantengroei ver oorzaken daarentegen een lossen bodem.

Maar van dit alles is, zooals reeds gezegd, niets met zekerheid be kend. De eerste berichten aangaande deze streken danken wij aan d Romeinen; de meeste dezer schrijvers hebben hun kennis echter niet doc eigen aanschouwing verkregen.

Zoo zegt Tacitus: 1) "De Rijn..... verdeelt zich bij den aanvan van het eiland der Batavieren als het ware in twee stroomen. Die (tak) welke langs Germanië loopt, behoudt den naam en den snellen stroom van den Rijn, totdat hij (zijn water) met den Oceaan vermengt. Wijde en kalmer stroomend is de tak welke langs Gallië loopt en dien de on wonenden Vahalis noemen. Spoedig verandert ook deze naam in die va Maas onder welken naam hij zich met een zeer wijden mond (imment ore) in den oceaan stort".

Caesar (De Bell. Gall. VI) "Hij zelf besloot naar de rivier de Schelde die in de Maas vloeit. (ad flumen Scaldim, quod influit in Mosam) e naar de uiterste grenzen der Ardennen op te trekken."

"De Maas.... na een tak van den Rijn ontvangen te hebben, welk de Waal genoemd wordt..... (Ceas. de Bell. Gall. IV).

In den Rijn zelven gelegen is het zeer beroemde eiland der Bataviere en Canninefaten, dat ongeveer 100000 passen lang is en ook andere al van de Frisiën, Chaucen, Frisiabonen, Sturiën en Marsaciën, welke ve spreid liggen tusschen den Helius en Flevus. Zoo worden de monden ge noemd, waardoor de Rijn zich uitstort, ten noorden in een meer, te westen in de rivier de Maas, terwijl hij zijn eigen naam behoudt in eer rivier van middelmatige groote, wier mond tusschen beide inligt." (Plinius Hist. IV).

De Rijn mondde dus met twee of drie takken 2) in zee, waarvan d

¹⁾ Ann. II, 6, zie ook J. Ab. Utrecht Dresselhuis. De Provincie Zeeland, N. Vert Zeeuw. Genoot. Dl. I, 1836 en H. D. J. van Schevichaven, Bijdragen tot een Geschië denis der Bataven 1875.

²⁾ Met betrekking tot de verschillende riviermondingen in de eerste eeuwen onze jaartelling zijn nog vele min of meer tegenstrijdige citaten aan Romeinsche schrijver te ontleenen. Hier zijn de thans vermelde voldoende, voor de overige verwijzen wi behalve naar de in de laatste noot genoemde werken naar Starings Bodem van Nederland

zuidelijkste met zeer groote opening (immenso ore) Helius genaamd werd. Ook de Maas liep hierin uit, terwijl zeer duidelijk staat vermeld, dat de Schelde in de Maas stroomde. Dit laatste is slechts mogelijk, wanneer de Schelde haar noordelijke richting langs Bergen op Zoom behield. Een aswijking naar links ongeveer in het bed der tegenwoordige Ooster- of Wester-Schelde zoude ook geheel in strijd zijn met de rotatiekracht. Deze ometelijke mond had wellicht de gedaante van een groot binnenmeer, is welks midden ongeveer het tegenwoordige Over-Flakkee lag, terwijl zijn oevers op het tegenwoordige Schouwen, Tholen, Brabant, Beyerland en Voorne vallen. Hiermede stemt overeen dat nog eeuwen later op Schouwen wordt gemeld in lacu villa Maudaco (A. Kluit, Historia Critica Comitatus Hollandiae et Zeelandiae), waarover later meer. Verder bestond t noordwestelijk deel van N. Brabant nog tot in de 16de eeuw uit rikanden, hetgeen o. a. blijken kan uit de kaart van de landmeter N. Diert van 1565, waarop Princelandt, Finert en Clundert als eilanden in de zoogenaamde meren voorkomen. De polders van Over-Flakkee zijn eest na 1300 ingedijkt; aanvankelijk bestond het eiland uit 3 deelen: Dirksland, Oude Tonge en Ooltgensplaat, welke omstreeks 1751 tot en geheel zijn vereenigd. Op Voorne wordt Brielle in 1257 reeds vermed. De andere polders zijn eerst veel later ingedijkt, terwijl tevens en voortgang van noordwest naar zuidoost bij de landaanwinning op te merken valt (pr. Oudenhoorn 1355, Nieuw Helvoet 1367, Naters 1412, de Gooten 1415, de Struiten 1475) 1). In de 10de en 11de eeuw bestond Tholen volgens Hollestelle (Geschied. Waterstaatk. beschrijving ran het eiland Tholen, Archief Zeeuwsch Genootsch. 4de Dl., 2de stuk, 1879) slechts uit Maartensdijk, Scherpenisse met het tegenwoordige Poortvliet en Schakerloo, terwijl meer westwaarts een klein eilandje Stavenisse.

De naam Helius van dezen mond is wellicht de oorsprong van Hellevoet. Het is bekend dat de Romeinen aan den Rijnmond eene hunner veeren op Engeland hadden. P. Caland vermeldt, dat in de 17de eeuw ten noorden van het tegenwoordige stadje Goeree oude fundamenten en Romeinsche munten zijn opgedolven. Dit waren wellicht de laatste sporen der Romeinsche nederzetting. Het is moeilijk aan te nemen, dat de Romeinen hier een versterkte plaats bezeten zouden hebben zonder veilige ligplaats voor de schepen, welke slechts een riviermond, die zehter den strandwal een binnenmeer vormde, konde opleveren. De

¹⁾ P. Caland, loc. cit.

meeste schrijvers (zie Kluit II, p. 138; Smallegange, Kronyk van Zeelan 1696, p. 136) doen de Maas ten noorden van den Briel en de Scheld door den Roompot in zee uitloopen. Terwijl het gat van Goeree als nie aanwezig op hunne kaarten is weggelaten. Het zoude dan zeer vreemd zijn hoe de Romeinen een nederzetting op Goeree hadden te midden van ee land en volk, waarvan Plinius getuigd, dat het zijn misera gens, die i een ongastvrij oord van slikken en poelen (instabilis terrae nec navigabili aqua) verblijf hielden. Zelfs ware hier nog een zeegat en havenplaats doch tevens reeds de Roompot, het zoude moeilijk met de doortastene heid der Romeinen overeen te brengen zijn, dat zij om deze haven ow land te bereiken, hetgeen slechts over den strandwal mogelijk was, no eerst de Scheldemond moesten oversteken. Het komt mij meer waarschijk lijk voor, dat de genoemde kaarten van Kluit en Smallegange eerst et veel lateren toestand kunnen voorstellen. Aanvankelijk liep de strandlij van Vlaanderen tot even benoorden Goeree ongebroken voort; hier wa het Helius met binnenmeer, waarin Rijn en Maas en Schelde uitmondder Eerst later, nadat de vloedstroom door de rotatiekracht de strandwal aat merkelijk versmald had en het door stormen opgezweepte water enkel zwakke punten doorbrak, ontstonden de andere zeegaten. Aanvankelij waren dit weinig beduidende openingen. Het met elken vloed binner dringende zeewater spoelde echter de weeke nederzettingen der rivierasvo (inslabilis terrae) gemakkelijk weg. Op die wijze breidde achter de dui keten het zeewater zich zijdelings en landwaarts uit, totdat bij hooge rivierwaterstand het rivierwater over de zelf opgeworpen dijken vloeiend een korteren gemakkelijkeren en wegens het eerder invallen van de e voor zuidelijke streken spoediger geopenden weg naar zee vond.

Aldus ontstond ook de Wester- en ook Ooster-Schelde, welks zeegathans Roompot, Ptolemeus (Descr. Orbis) de nieuwe mond de Schelde noemt (Tabuda of Novium Ostium Scaldis), welke benamis ook op de oude kaarten voorkomt, waardoor overtuigend bewezen word dat er vroeger een andere Scheldemond was, welke slechts noordwaarkon zijn.

Men moet zich echter deze veranderde uitmonding niet als het wer van weinige tientallen van jaren voorstellen. Het is waarschijnlijk, dat o den veengrond, thans den ondergrond van Zeeland uitmakende, tijden zijn afzetting door het Scheldewater een menigte geulen waren overgebleven.

Toen de zuidwestelijke hoek van het haff zuidwestwaarts ongeveer va een lijn loopende van Roemerswaal loopende via Zierikzee, Brouwershave maar Goeree reeds met alluvium was aangevuld, liep de Schelde noordwaarts, tot zij ongeveer bij Roemerswaal en Tholen in het Helius van Plinius uitstortte. Langzamerhand zou ook dit trechtervormlg einde van het Helius door de Schelde met slikken en gorzen zijn aangevuld, ware toen niet het Novium Ostium Scaldis ontstaan. Het Scheldewater liep dentengevolge en tevens door Zuidvliet, Golde en andere takken spoediger naar zee. Hollestelle schetst dan ook de toestand van het tegenwoordige Tholen en St.-Philipsland als een binnenmeer. De eerste aanwas door de Schelde zijn kleine eilandjes Schakerloo, Spijkenisse, Maartensdijk en Stavenisse. Naarmate de hier tusschenliggende geulen Strienne, Pluimpot, Breedevliet aanslibden, werden deze eilanden 6én; eerst later, onafhankelijk van de Schelde, ontstonden de noordelijke inpoldetingen.

Ook de vrij regelmatige helling van Zuid naar Noord van den bodem van Tholen wijst hierop. Dit aannemende zou dus Tholen hoewel de jongste aanwas eigenlijk in hoofdzaak geen delta van de Schelde zijn, maar wel de later echter tengevolge van het indringen van de zee grootendeels weer verloren geraakte schorren en aanwassen op en om Schousen en Duiveland.

Het is hierdoor verklaarbaar hoe de naam van dit eiland van Schelde, eertijds Schoude geheeten, afkomstig zoude zijn, zooals bij Smallegange (blz. 253) en ook Boxhorn (blz. 301) voorkomt. "Het eiland Schouwen ankt zijn naam aan de Schelde, welke laatste oudtijds Schoude heette. De latijnsche schrijvers noemen de rivier Schaldus, Schaldis, Schoudus, a.a. Guilielmus Brito Philippidos lib. 9:"

Urbs erat et rebus, et cive superba potenti, Nomine Tornacum, Schoudi contermina ripae 1)

(ie ook Reygerbergh, Boxhorn en Dresselhuis, blz. 4). Ook Guicciardini (1565, Holl. uitgave Beschrijvinghe van alle de Nederlanden enz. t'Amsterdam 1612) deelt zulks blz. 266 mede: "Het voornaemste Eylandt van Beoosterscheldt wordt nu ter tijdt in Latijn gheheeten Scaldia, van den vloedt Schelde, ende in Nederduitsch Schouwe; welck seer groot plach zijn; maer is seer vermindert ende verdorven door overvloedt ende tempeeste der Zee. Het heeft nu noch omtrent seven mijlen in het sonde, ende is eertijds soo nae Noordbevelandt gheweest dat d'inwoonders

i) Het was een stad rijk aan goed en burgers, Tornacum geheeten, grenzend aan toevers van de Schaudus. Dit Tornacum komt ook voor op Peutinger's bekende bart en is wellicht Doornik.

met malkanderen sprake hielden: maer zijn nu teghenwoordichlijck me een zeer wijdt water van malkanderen gescheyden".

Men ziet hieruit tevens welk een onbeduidend waterloopje eertijds d Oosterschelde was. Zulks kan ook nog blijken uit hetgeen Smallegang (blz. 245) met betrekking tot een veel lateren toestand mededeelt.

De Wester-Schelde, loopende tusschen Brabant en Zeeland tot voorb Bergen op Zoom "en van daer tusschen het land van ter Tholen en d slykken des lands Reimerswale, tusschen Westkerkke en Iersicke; en da het land van Zuidbeveland verlatende voorbij St.-Maertensdijk beooste de Catteplaet en den Onbekenden, van waer zij strekt naar Colijnsplate dat latende bewesten en beoosten in 't Fael vallende, aengemerkt he diep van d'oude Schelde hier t'eenenmael verloopen en verland is; n zijn aan malkander vastgegroeit het land van Noortbeveland, dat altij Bewesterscheld is geweest en de Gorsingen van de Vyse en Laaye plate die oit en oit Beoosterschelde zyn gerekent; hebbende oversulks eertij de Schelde daer doorgeloopen, beoosten van de geinundeerde Slijkke van Noordbeveland tot door den Roompot in zee".

Het hier aangeduide stroompje tusschen Noordbeveland ten eenent e Vyze en Laaye plaet ten andere, was zeer onaanzienlijk, maar tevens blijl hieruit reeds het rechts opdringen der Schelde, welke later zoo noodlott voor het eiland Schouwen geweest is.

Het tijdstip der catastrophe aan welke de verschillende zeegaten hu allereerste vorming danken, is in 't geheel niet op te geven. Wij hebbe reeds gezien, dat ten tijde van Ptolomeus de Roompot reeds bestom aangaande het Brouwershavensche gat mocht het mij niet gelukken ie vermeld te vinden. De benaming *Masemude* komt reeds in 774 vo (Dresselhuis blz. 74), het blijft echter onzeker of hierbij de monding b Goeree of bij den Briel bedoeld wordt. In 1254 wordt de Masemud door koning Willem als de noordelijke grens van Zeeland opgegeve Ook in een charter van 1 Juni 1271 van Floris V komt zij voor: e parte oridentale der Mase, vel ex parte occidentale der Zwene (Kluit I p. 778).

Het is zeer waarschijnlijk dat in al deze berichten de maasmond te noorden van den Briel bedoeld wordt.

Het oudste bericht omtrent Zeeland, dat echter slechts uit de tweet hand tot ons is gekomen door Reygersbergh en Guicciardini (zie 60 Dresselhuis blz. 48), is van Corn. Battus, geneesheer van Adolf va Bourgondie. Het schijnt dat deze in zijne cosmographie (1512) mededeel "dat hij oudt geschrift heeft ghesien, daer in stondt, hoe omtrent he

eerste jaer nae ons Heeren gheboorte, ende sommighe tyden daer nae, Zeelandt niet anders en is geweest dan veel kleyne Eylandekens met menigherley slooten ende waterloopen, van malkanderen afgescheyden: maer dat by gheval ende tempeeste der Zee de Schelde eenen nieuwen stroom oft loop ghenomen heeft mits welke zy gescheyden zyn in het jaer 1438" (Guicciardini p. 264). Met dezen nieuwen stroom kan slechts de Oosterschelde bedoeld zijn.

"Het eerste geschiedkundige bericht", zegt Dresselhuis (blz. 57), "hetgeen van de Zeeuwsche eilanden onder derzelver tegenwoordige benamingen voorkomt, is in de nalatenschap van Geertruida dochter van Pepyn van Landen, die, ten jare 658, in den ouderdom van 33 j. stierf (Kluit, Chron. Egm. pag. 4). Wij lezen trouwens bij Miraeus (Opp. Dipl. T. I, p. 654) "hereditas S. Gertrudis in pago Tessandria, super fluvio Struona; in villa quae dicitur Bergom, cum integritate sua illic aspiciente; insulae tres, prima Bivelant, secunda Spiesant, tertia Gerselre."

In de 2e helft der zevende eeuw liep dus reeds de hoofdtak der Schelde Noordwestwaarts en had een tak der oude noordelijke monding reeds den naam Struona of Strienen verkregen.

Waarschijnlijk maakt ditzelfde erfgoed een deel uit van de schenking waarmee Otto II de abdij van St. Baaf of Bavo te Gent begiftigde en door welke het eiland vermoedelijk zijn naam van Bavoland of Beveland verkreeg. In dit charter (zie Kluit II, 41) wordt de bezitting omschreven: in pago Scaldis possessionem vocabulo Crebca et Papingalant cum aecclesia super fluvium Golda terram, in qua possunt ali 900 oves et in pago Bevelanda omnem terram a Suthera Suthfita usque Curtagosam et Campan.

Hieruit kunnen wij opmaken, dat het tegenwoordige water tusschen Noordbeveland en de eilanden, welke thans Schouwen vormen, zeer onbeduidend geweest moet zijn, anders ware Campen wel in pago Scaldis opgegeven; bovendien worden twee later zeer bekende stroomen Zuidvliet en Golde genoemd. Wij zullen dus niet veel mistasten, wanneer wij deze beide, vooral de laatste met de overige takken tusschen de verschillende deelen van Schouwen-Duiveland als de hoofdmonding van de Schelde anzien.

Tevens is hieruit te besluiten, dat de oudste steden of nederzettingen nin Crebca, het latere Kreecke, zuidoostwaarts van het latere Reimersvaal, Goes of Cortgene en Campen de noordwestelijke punt van N. Beveland, terwijl het overige uit niet veel meer dan schapenschorren en

slikken schijnt bestaan te hebben. Het Crebca als vermeld zijnde cum aecclesia schijnt wel het voornaamste te zijn geweest, in zooverre als de rivieroevers het menigvuldigst aan alluviale nederzettingen blootgesteld zijnde, het hoogst moesten zijn en dus het eerst bewoonbaar, valt dit ook niet te verwonderen.

De eerste vermelding van Tholen vinden wij eerst omstreeks 1200, welke zich hieruit verklaart, dat dit eiland aanvankelijk een deltavorming der Schelde, slechts weinig in hoogte kon toenemen nadat de hoofdstroom noordwestwaarts voor dit gors afweek; de oudste gedeelten zijn het zuidelijke Schakerloo en Poortvliet.

Tot aan de 14° en 15° eeuw bestond er nog geen Honte of Wester-Schelde. Warnkönig (Flandrische Staats- und Rechtsgeschichte bis zum Jahre 1305, Tubingen 1835) zegt nl. (Bd. I, p. 96): Alle diese zum Lande der ersten Grafen von Flandren gehörenden Gauen sind ein Theil von Neustriën dessen nordöstliche Grenze in Belgien die Schelde wars die auch nachher immer allda Frankreich von Lothringen und so von Deutschland trennte, ehe Kaiser Otto einen Landstrich auf dem linken Scheldeufer zum Reiche schlug. Sogar die seelandischen Inseln scheinen zu Neustriën gehört zu haben, da der östliche Arm der Schelde, fruhe allein Schelde genannt, die Grenze bildete. Auch waren jene Inseln ein flandrisches Lehen, und die Grafen von Holland dafür flandrische Vasallen.

Onder deze seelandische Inseln is echter niet op te nemen de aanwaasen welke Schakerloo en Tholen vormden. Deze behoorden in het geeste lijke evenals de Brabantsche eilanden Princelandt, Finert en Klunder (ook nog veel later als eilanden voorkomende, zooals blijkt uit de kaar van den landmeter N. Diert v. 1565) niet onder den bisschop van Utrech zooals het overige Zeeland, maar onder dien van Luik, zooals geheer Brabant. Op Tholen of Tertholen werd dan ook tol geheven voor der graaf van Brabant, gelijk te Iersickeroirt voor dien van Zeeland.

Dat het land van Saestinge in het tegenwoordige Staats-Vlaandere eertijds verbonden was aan Zuid-Beveland, blijkt uit een charter van 1345 waarin, onder meer andere goederen in Zuid-Beveland gelegen, gewag gemaakt wordt van "tiende en pacht toit Scastekynspolre" (Mieris II, 691)

Er is reeds op gewezen hoe de nieuwe Scheldemondingen ontstaan zij door het langzaam binnenwaarts dringen van het zeewater binnen aan vankelijk nauwe strand-doorbraken, en het nu en dan overloopen en zij waarts wegvloeien van het rivierwater naar deze strand-doorbraken. Een maal binnen de strandbarrière moesten de vrijliggende thonige sedimente van Ypres en Boom met de organische verweerproducten, alsmede de daronder liggende tertiaire mergelgronden bij gebrek aan bindmiddelen spedig wijken voor de erodeerende werking van het zeewater. Aldus ontstonden in den beginne min of meer groote poelen of meeren evenals achter het oude Helium, welke door menigvuldige wateraderen met elkaar in verband stonden.

Eveneens spoelden de van de hooger gelegen landen in Vlaanderen afkomende beekjes, deze weeke gronden meer en meer uit. De voornaamste dezer stroomde bij Brugge in het zich hier spitsvormig verlengende binnenmeer het Zwin Zwyn Zwen Zuyn. Tot 1180 stroomde het zeewater tot in de nabijheid van Brugge, daar echter in dit jaar de stad gevaar liep, werd de reeds bestaande dam een mijl ten noorden van de stad versterkt; aan dezen dam begon de haven hetgeen weldra aan een bloeiende handelsstad Damme het aanzijn schonk, terwijl in de 13e eeuw wog andere welvarende handelssteden zooals Sluis verrezen. (Zie Warnkönig) In de eerste tijden stonden deze poelen wellicht slechts bij hoog water in gemeenschap met de zee, zooals thans nog dergelijke meren op de Zuid-Braziliaansche kust, doch de onophoudelijke afschuring van den naar

Am het ontstaan der Wielingen is nog de volgende legende verbonden (zeer uitvoerig Warnkönig I, p. 223—230; Kluit, p. 139—151).

richts dringenden vloedstroom deed weldra in de resten van den strandwal

en diepe geul ontstaan.

Zocals reeds vermeld is, maakte de Schelde de grensscheiding tusschen Manderen-Brabant uit, totdat omstreeks 936-980 Keizer Otto op vroemen neustrischen bodem van Gent tot de Honte een kanaal liet graven, at naar hem fossa Ottoniana geheeten, Frankrijk van Duitschland cheidde. In den loop der eeuwen is de mond van dit kanaal, dat slechts idelijk door Honte en Wielingen in zee uitmonde, door de overlevering de zeekust tusschen Vlissingen-Cadzand verlegd. Bij de groote mestrooming welke Vlaanderen omstreeks 1377 teisterde zouden de door miren (wielen) beheerschte sluizen zijn weggespoeld, van welke de naam kefingen nog over is gebleven. Zoowel de in oude charters doorkneden Imit, als de geleerde Warnkönig, welke laatste geholpen door Dr. Gehldorf, n onderzoek ter plaatse instelde, loochenen het fabeltje. Warnkönig ent aan dat de monding der fossa Ottoniana in de Honte tusschen ervliet en het in 1377 verdronken dorp Piet gelegen moet hebben. geheele strijd is van te minder belang daar hij eigenlijk loopt over volgens de kanunnik de Bast met vreemde hand verbeterd manuscript regarde het woord fossat(a) (um) (o). De verklaring van het woord

Wielingen zocht Gehldorf in woelen, waardoor een watervlakte met kolken of neeren zou worden aangeduid. Deze verklaring komt ook mij, als geheel overeenstemmende met de in de eerste afdeeling verklaarde draaiende beweging in het komvormige zeegat, als de ware voor.

Thans wordt nog in zuidwestelijk Brabant, wellicht ook in Zeeland, een komvormige verwijding in een waterloop, een wiel of wieling genaamd. Ook het met water gevulde gat achter een dijkbreuk heet thans nog wiel en wat was de oorsprong onzer zeegaten anders dan een uitgespoeld gal achter een doorbraak in de duinen?

In vroeger eeuwen schijnt deze naam in onze zeegaten niet zeld zaam geweest te zijn. Zoo deelt van Wijnen uit een onuitgegeven acte anno 1437 van den Briel, zie Kluit I, p. 107, mede: "Dit selve schij metten goeden quam alleen gedreven binnen de Wiele ende Bornisse dat welcke was op des heeren stroom ende watere van Putte" En verder "Dat die van Heenvliet, die dat schip aengevaert hadden weder brenge souden op den stroom voor Heenvliet in de Wiele." En nog eens "Nie geweten, dat hun die van Heenvliet yet hebben mogen vermeten eenig luden uyt ten schepen die in de Wiel comen aen dat heenvlietsche lant te voeren."

Evenzoo op blz. 108 "item van Zantshofde te halven diepe tote Aben brouche op Widele. Eindelijk op blz. 109 volgens een mededeeling van H. van Wijnen aan Kluit: "By verloop van tyden heeft de Wiede haar naam verlooren, en de geheele rivier dien van Bornesse aangene men, welken zy noch in haer eigen kil behoud. Teiling in zijne onwigegeven Chronyk van Voorne, p. 130, spreekt van Heenvliet over di stede van Geervliet, alwaar tusschen beiden een rivier loopt, eertijds genoemd die Wiel nu Bornesse; en in een origineele kaert van de Masten Merwede, sulckx die nu is ende loep heeft, d. 26 Juli 1565, lees it Bernisse alias de ouwe Wielinge."

Hieruit blijkt dus hoe voor eeuwen ook tusschen Geervliet en Hees vliet een dergelijke kom of wieling geweest is.

De meest waarschijnlijke toestand ten Zuiden van Walcheren omstreel 1300 komt mij die voor, welke door Gehldorf in 1835 in kaart is gebracht (z Warnkönig I, p. 102, hier kaart N°1). Buiten de kustlijn vinden wij een eilan Scooneveld, thans geheel verdwenen, waar de graven van Vlaanderen een sk bezaten, daarachter een ongeveer in noordoostelijke richting loopende stram lijn met duinen bezet; tusschen Walcheren en Vlaanderen een betrekkelij nauwen vaarweg toegang verleenende tot een wijde binnenzee, wier grooste afmeting ongeveer evenwijdig is met de kustlijn. Gehldorf teekende i

de verwijding tusschen de bocht in de Walchersche kust en Wulpen een langwerpige plaat, die slechts dan mogelijk zou zijn wanneer hier voldoende afvoer van rivierwater door de achterliggende Kille, Diepenhee en Honte plaats had, hetgeen destijds niet het geval was. Ook de plaatsing van het woord wielingen op de kaart een weinig oostwaarts van het tegenwoordige Breskens in een kanaal tusschen Vlissingen en eenige overliggende polders komt mij minder juist voor. Het voorste gedeelte van de binnenzee, welke naar Sluis en Damme leidde, ten noorden van Suutsant, zal waarschijnlijk komvormig geweest zijn met een ronde zandplaat in het midden en bekend zijn geweest onder den naam van Wielingen. Het is althans moeilijk begrijpelijk, hoe het water in een tamelijk regelmatig kanaal draaien of wielen zoude. Ook komt de tegenwoordig als Wielingen bekende vaarweg niet overeen met de plaats welke Gehldorf aldus aandaidde, maar wel met het hier geschetste gedeelte later door uitbreiding midwaarts ten koste van Wulpen nog vergroot.

Vooral valt bij de vorming van dit zeegat op te merken, hoe de noordelijke oever die van Walcheren sedert eeuwen en eeuwen slechts weinig door stroomschuring of dijkvallen veranderd is, terwijl het zeegat zich nagenoeg uitsluitend gevormd heeft ten koste van den oever van Vlaanderen, waaruit wij ten duidelijkste zien kunnen, dat het niet de ebstroom is welke onze zeegaten gevormd heeft of op diepte houdt, maar de vloedstroom.

Aangaande den ouden toestand van dit zeegat kunnen wij nog het volgende mededeelen. Volgens Gehldorf was Wulpen aanvankelijk vast aan Vlaanderen. Dresselhuijs zegt, (p. 119), dat Wulpen reeds in de 100 eeuw genoemd wordt (Miraeus I, 44; vg. III, 30). Het schijnt reeds vroeg verloren te zijn gegaan "want in den omslag der belastingen over de onderscheiden leden van Vlaanderen van het jaar 1517 wordt het gemeld als geheel verdronken (Placaatboek van Vlaanderen D. I, p. 571)." Ongeveer 450 gemeten zijn in 1638 herwonnen. In 1774 (18 Nov.) brak de zeedijk door, nadat kort te voren een inlaagdijk was gelegd, doch ook deze bezweek 7 Dec. 1797. Ongeveer op dezelfde plaats ging 22 Jan. 1802 de Zwarte polder verloren, waarvan thans slechts een klein gedeelte, de westelijke, 30 H.A. herbedijkt zijn. Dit is slechts een voorbeeld van de uitgestrektheden lands, welke hier door den vloedstroom als machtig werktuig van de zee verslonden zijn. De totale hoegrootheid van het enorme landverlies, noord- en westwaarts van Cadzand, laat zich slechts met benadering schatten uit Gehldorf's kaart.

De grootste ramp die deze streken trof, is zeker wel de overstrooming

van 1377, waardoor de Honte aanzienlijk verbreed werd. Voor dien tijd schijnt het vaste land van Vlaanderen zich veel meer noordwaarts tot onder den zuidbevelandschen wal te hebben uitgestrekt, alleen zuidwestwaarts van Vlissingen was een kleine binnenzee aanwezig. In 1377 werden in Vlaanderen overstoomd Ysendic, St. Nicolai tot Hammer, Piet, St. Marie bij Biervliet, hetgeen bij dezen ramp een eiland werd, de kloosters Willemyne en St. Johannus in Eremo, Roesselaere, Hellemaere, Schoondijk, Gaternesse, St. Margerethe, St. Catheline, Osmanskerke, Caukerke, Watervliet, Nivelle, Hugevliet, Segerwillge, Bochout, Volmerbeke.

Vele dezer dorpen en landen werden na het aftrekken van het water weder bewoond of later ingedijkt, echter bleef menig voor altijd onder water. Een duidelijk inzicht in den omvang van deze ramp leveren ons de kaarten v. Gehldorf, Smallegange in vergelijking van die van Guicciardyn (kaart N° 2). De beide eerste zijn echter hypothetisch, die van Gehldorf is na autenthieke bronnen omstreeks 1835 samengesteld. Die van Smallegange (kaart N° 3) is gecopieerd naar een copy uit het jaar 1610 van een kaart van 1274. Volgens Warnkönig (I, p. 227) kan zij werkelijk niet van 1274 dateeren, maar hoogstens van 1376, en schijnt zij wellicht, volgens oude opgaven, vervaardigd, om de grenzen van het door de zee verzwolgen gebied in de herinnering te laten voortleven.

Er is reeds op gewezen hoe de Wielingen zich zuidwestwaarts uitbreidende en geholpen door de aanvallen van de zee langzamerhand met deze laatste één werden. Het zuidelijk gedeelte van deze binnenzee verzandde des te meer en zulks moest nog sneller geschieden toen na de doorbraak van 1377 het water langs een veel korteren weg, dan vroeger door de Heydenzee, geloosd kon worden. De polders op Gehldorf's kaart over Vlissingen gelegen, komen mij eenigzins twijfelachtig voor, daar de eerste bedijking, in deze streek, eerst van het einde der 15de eeuw dagteekend. "Ontwijselbaar blijkt dit uit Maximiliaan's "uitgiste van Breskenssant om 't zelve te bedykken tot koornlanden"" (gegeven ten jare 1480, te vinden gedeeltelijk bij Kluit, II, p. 1078, geheel bij L. v. Oostdorp, het regt van de Heeren Staten van Zeeland op de Hoofdplaat, blz. 39, 40) waarin die polder gezegd wordt te zijn ""gheleghe ende hem streckende, binnen den lande ende limieten des Graafschaps van Vlaanderen, op de wilde zee ende op 't gadt ende poort van der zee, geheeten die Wielinghe, tusschen denzelven lande van Vlaenderen, ende dat Eylandt van Walcheren in Zeeland."" (Dresselhuis, p. 93).

Het schijnt dat Gehldorf (zie Warnkönig, blz. 231) deze smalle Wielingen op gezag van Kluit heeft aangenomen. Ook de aanwezigheid van

een zandplaat bewesten Vlissingen in het midden van de Wielingen blijkt uit menige aanteekening (zie Dresselhuis, p. 113, 114). Wij beperken ons tot het volgende: "zoo zegt Stoke (B VII, vs. 1117, D. III, blz. 70) van jonkheer Willem in 1302

En voer met eenen sconen here Van Arnemuiden over dat meere Tote in Vlaanderen".

"En nogthans kwamen zij binnen de Vloeren, een zandbank voor Breskens, op vele kaarten geteekend, welke de schepen dwong het bij Vlissingen te houden (Gargon, Walch. Ark. II, blz. 122) voeren van daar tegen stroom en wind door het zwarte gat verder op, en landden te ter Hofstede op Cadzand" d. i. ongeveer 3 K. M. noordwaarts van Sluis.

Dat het water meer binnenwaarts van de Wielingen tot de Schelde, Honte genaamd, geheel onbeduidend was, heeft Kluit (Excursus VII, p. 118—138) uitvoerig bewezen. Slechts een zijner reeds geheel afdoende bewijsgronden met een dergelijken door Warnkönig (I, p. 230) aangevoerd zij het vergund hier weer te geven.

De laatste ontleend aan Willems' Mengelingen, afl. 71, p. 496, en voorkomende in een charter van Karel den Stoute, Anno 1469, luidt als volgt:

Au temps passé l'eau de la Honte estoit si petite, que nuls ou bien peu de navires passoient parmi notre pays de Zeeland; et que par les innondations l'eau de la dicte rivière de la Honte estoit devenue plus navigable et plus profonde, qu'elle n'estoit au paravant: tellement que tous ou la plus part des navires alont et venont et nostre ville d'Anvers, passant la dite rivière de la Honte.

Het eerste aan Kluit (II, 2, 1081) ontleende stuk komt voor in een vonnis van het hof te Mechelen Anno 1504 en luidt: "seue dame Jacques contesse de Hollande et Zeelande voyant que par les grandes inundations qui advindrent en son temps et aussi au paravant tant en Flandres que en Hollande ladt rivière de la Honte que par avant avoit esté sette estroite et peu prosonde estoit devenue si grande large et parsonde, que tous les bateaulx tant Karakes gallaes que y poivent franchement navier et passer que les marchans estrangiers commencoient a prandre leur chemin pour tirer en Brabant par icelle Honte, en delaissant le chemin de lescaule de tout temps accoustumé en sraudant par ce nostre tonlieu de Yersickeroort."

Deze toenemende geschiktheid, van de Honte als waterweg, was een gevolg van den grooteren afvoer van Scheldewater. Ondanks dat bij den vloed van 1377 de linkeroever, het tegenwoordige Staatsvlaanderen, het

meest te lijden had gehad van het water, bleef de vaarweg, zooals uit menige oude aanteekening blijkt, steeds onder den Zuid-Bevelandschen wal, waardoor dus weder het rechts dringen van den stroom wordt aangetoond. Die toenemende rivierafvoer moet in de Wielingen allereerst een opruiming van de middenplaat tengevolge gehad hebben, wijl op den duur de levende kracht van het afstroomende water de wielende werking van den vloedstroom meer en meer belemmerde en aldus de oorzaak tot het vormen van een kom of wiel aan banden legde. De bedijking van Breskenszand in 1480 was hiervan het begin. Aanvankelijk bleef er nu nog een wijde watervlakte tusschen Gaternisse en Arnemuiden over, doch zooals reeds gezegd is, het met voldoende kracht afstroomende Scheldewater, in de engte tusschen Vlissingen en Breskens, beperkte de werking van den vloedstroom. Wij vinden dan ook het Sloe langzamerhand aanslikkende, alhoewel het westelijk gedeelte van Borselen in de 14de en 15de eeuw nog veel te lijden heeft gehad van stormvloeden en de geheele polder na den doorbraak van 1532, 84 jaar bleet drijven tot de herdijking in 1616. Het Arnemuiderzand werd hooger en hooger; hier werd gewonnen in 1631 St. Joostland, 1644 Nieuwland, 1645 Middelburger pr, 1661 Nieuwerkerker pr, 1671 Nieuw St. Joostland. Aan de overzijde werd bedijkt Nieuw Craijert (1611), West Craijert (1642), Nieuwe West Craijert (1676), Noord Craijert (1696), Craijert (1700), Konings pr. (1753). Later ontstond tusschen Walcheren en Zuid-Beveland een groote plaat 't Vlakke, thans Caloot; ten noordoosten grenst hiertegen de Citters pr, bedijkt 1861, welke weder paalt aan de Craijert.

Het is waarschijnlijk, dat deze aanwinsten in het Sloe in verband staan met de vernauwing van het Veergat, tengevolge der herbedijkingen op West Noord-Beveland. Evenwel kan dit niet de eenige reden zijn, want ook zuid- en westwaarts van den polder Borselen is volgens de kaart van 1632 (zie Conrad, Oeververdediging) een aanzienlijk voorland aanwezig. Hier werd in 1645 de Wolpherts pr., in 1674 de pr. Watervliet gewonnen. Was in vroeger eeuwen hier slechts sprake van overstrooming bij stormvloeden en waren de dijken door voorliggende gorzen beschermd, geheel anders werd de toestand bij den toenemenden afvoer van de Honte.

"De zandplaten schijnen spoedig door den stroom te zijn afgenomen, want den 7den Nov. 1678 deelen ingelanden van den Watervliet-polder aan de Staten van Zeeland mede: dat de polder sedert de bedijking wel driehonderd roeden is afgenomen in breedte en diepte, zoo van schorre als ingedijkt land, waardoor zij genoodzaakt waren, tot tweemaal toe, te

leggen een zware inlaag, en dat zij, vermits de vooroever nu weder tot in den dijk was weggevallen, een anderen zwaren inlaag van wel 500 meden lengte moeten leggen (Conrad, p. 52).

Hiermede is de periode der dijkvallen geopend en die der daaruit wortvloeiende inlagen om het land tegen den meer en meer in vermogen winnenden en rechts dringenden Scheldestroom te beschermen.

In 1682 vloeit de polder Watervliet reeds voor immer, in 1715 de Wolphertspolder. Ook in den polder Borselen werden herhaaldelijk kuipjes of aanzienlijke inlagen, zooals in 1685 en 1721, (thans zeedijk), soodig geoordeeld. Tot in deze eeuw staan dijkvallen en inlagen daar aangeteekend.

An den oever van Gatternisse werd op 4 Juni 1624 door de Staten van Zeeland, de hoofdplaat als schor, voor 23 jaar verpacht. Doch (en hieruit kan men weer zeer leerrijk het rechtsdringen van den vloedstroom zien) de pacht werd reeds over de eerste zeven jaren kwijtgescholden (Resol. 17 Mrt. 1655). Eerst in 1778 is dit schor, groot 3880 gemeten, bedijkt. In 1795 begon men reeds inlagen te leggen en in 1836 kon de polder hoogstens 2000 gemeten halen. (Dresselhuis, p. 116).

Wij hebben reeds aangetoond, dat de Ooster-Schelde zoowel als de tegenwoordige Roompot en de geul tusschen N.-Beveland en Walcheren zer gering waren. Reeds vroegtijdig schijnen deze door den vloedstroom in aanzienlijke mate verruimd te zijn. Reigersbergh zegt omtrent den toestand van 1393 (uitgave Boxhorn II, p. 172) "Ende 't Veergat worde van daghe te daghe, grooter, wyder ende breeder, overmidts die groote stroomen ende vloeden, die daghelickx uyter zee quamen, ende mede omdat 't zeewater veel ruymte kreech van die gheinundeerde landen. Desgelycks 't gat van der Wielinghe." Terwijl in vroeger tijden "Vere zich uitstrekte tot tegen Schouwen en N.-Beveland; — dat deze beide cilanden zoo na aan elkander grensden, dat de vrouwen, die aan den oever waschten, elkander den bokstok toewerpen en een praatje houden konden." (Dresselhuis p. 4).

Ook twee tot drie eeuwen later heeft nog een voortdurende verruiming van den doorbraak tusschen Schouwen en Walcheren plaats. Smallegange (1696) zegt op p. 267: "Omstrent ruim 40 jaren geleden is er, buiten voorgaende kennis van zeevaerende lieden, dwars door de Banjaerts plaat of Bank een effen en bequam diep gevonden 't welk men het Reschegat noemt, waerdoor de visschers beter als door de Kele konnen in en uitlaveren; ja zelfs de Schepen, die naer het Zuidwesten uit- of van daer inkomen willen; doch deze gebruiken meest den Roompot."

Welk een krachtige vloedstroom door het Veergat in Zuidvliet en Schenge naar binnendrong, laat zich eenigszins opmaken uit het toenmaals bekende versje:

> Zuidvliet ende Schengen Loopen beide om strengen Hebben haer vermeten Willen Wolfaertsdyk opeten

Op de beide het meest door "opeten" bedreigde punten aan de zuidelijke dijken van Noord-Beveland werden dan ook reeds in 1340 de beide eerste inlagen gelegd bij Wissekerke en oostwaarts van Cortgene onder Emelisse. Door de verruiming van het Veergat en de Roompot heeft N.-Beveland echter meer en meer blootgestaan aan stormvloeden zooals in 1288, 1304, 1334, 1352, 1421, 1477 waarbij Campens Nieuwland verloren ging en eindelijk in 1530 toen het geheele eiland onderliep en gedurende 68 jaren drijvende bleef. Over deze rampen zie men uit voerig Hollestelle, Archief Zeeuw. Genoots. 50 Dl. 1883.

Ook thans gaat door het veel engere Veergat en Zuidvliet een krachtige getijstroom (zie Verslag omtrent onderzoekingen op de oester en de oester cultuur betrekking hebbende, uitgeg. d. d. Ned. Dierk. Vereeniging 1883—84).

In de tweede helft der 16e eeuw werden N.-Beveland en de beide dee len van Orizant weer tot bedijking geschikt. Hoe geheel verschillend van thans, de toestand destijds was, daar de vloedstroom door het Veergat zich over geheel N.-Beveland vrijelijk verspreiden kon, blijkt hieruit, dat op de Westkust van West-Orizant of Ouwe Leek, ten noorden van de tegenwoordige Vliete-, Thoorn- en Sophiapolders, alsmede op het wes telijk deel van Orizant ten noorden van Oud N.-Beveland door wind en golven opgeworpen duinen aanwezig waren. Zulks wordt ook duidelijk door den naam van Orizant of Worige zand (= ruigte van zand) te ken nen gegeven. De Ooster-Schelde, naar noordoost opdringend, begon de herbedijking op het oostelijk deel van N.-Beveland. Ook vóór het verliet van het eiland was op deze zijde het Cats Nieuwland gewonnen, doch in 1404 weer verloren. In 1598 werd Oud N.-Beveland herdijkt, in 1601 het oostelijk deel van Orizant, in 1616 Nieuw N.-Beveland, in 1652 de Frederiks pr., in 1651 Geersdijk en Wissekerke enz. In de eerstvolgende honderd jaren gaat de inpoldering westwaarts snel voort, doch naarmate hierdoor het Veergat verengd wordt en de vloedstroom gedwongen recht uit oostwaarts te stroomen in de O.-Schelde, begint de reeks van rampen door inlagen en dijkvallen, tot op heden voortdurend gekenmerkt. Hel in 1602 bedijkte Orizant ging in 1658 reeds verloren, Oud 's Gravenhoek gewonnen in 1657 vloeit voor immer in 1732, Nieuw 's Gravenhoek gewonnen in 1671 loopt onder in 1743 (zie Conrad).

Met uitzondering van de beide inlagen van 1340 aan den zuidelijken oever, zijn voor de tweede helft der 17de eeuw slechts stormvloeden als noodlottig voor N.-Beveland geboekt, eerst na 1652 begint het langzamerhand terugtrekken achter inlagen.

Geheel anders is de toestand op den rechteroever der O.-Schelde, n. l. Tholen, Duiveland en Schouwen. Eertijds bestond Schouwen uit zes deelen, doch reeds vroeg heeft hier aanzienlijk grondverlies door het rechtsdringen der Schelde plaats gegrepen. Deze "grondbrexemen" verminderen eerst in de 180 eeuw, toen juist Borselen begon te lijden.

In de 13e eeuw moet Schouwen nog uit 6 deelen bestaan hebben of althans het zesde deel gedeeltelijk nog aanwezig geweest zijn. Onbegrijpelijk is anders de keur, die Smallegange (p. 254) en ook Boxhorn (p. 302) mededeelt, in welke "Florens, Grave van Holland, Maendachs voor Vastelavondt in 't jaer ons Heeren duysent twee honderd ende 't negentich" zes dijkgraven of dijkraden aanstelt: "dat wij nemen daartoe in elken vijften zestendeele, eenen man, sonder in sulcke twee mannen"; volgen zes namen. Hoe nu 6 personen kunnen benoemd worden in vijf zestendeele zonder in één twee aan te wijzen, terwijl ook geen hunner een algemeen bestuurder is (want er is verder in denzelfden keur sprake van een "overman" over deze zes) is een onopgelost raadsel.

"In den jaere 1505 vindt men het vermindert in vijf deelen (Smallegange P. 255) Een dezer "het tweede vijftendeel is genaemt geweest Zuidtland der inne gelegen en gestaen hebben de Dorpen van Zuidtkerke, 's Heersymons-kerke, Sint Jacobskerke en Brieskerke met een gebuurte, gement, Sheerarentshaven, die al te samen bij den grondbrexemen en inlagen vergaen, en van versche in soute buiten gesleept zijn. En om dien grooten uitslag, die in 't vijftendeel van Zuidtland geschiet is, zoo it 't zelfde vijftendeel soo vermindert, en gekomen op 1300 gemeten, of der omtrent; daerom dat bij consent van de Staten van den Lande van Schouwen, 't selfde vijftendeel is geannexeert aen 't Wester-vijftendeel, en zan Kerkwerve, in 't jaer 1558; zoodat het land van Schouwen nu in vier deelen gedeelt is." (Small. p. 255).

Bij de opsomming der plaatsen gelegen in deze vier deelen zegt onze kroniekschrijver verder: "In Poortambacht ligt de stad Zierikzee en bij gewigenisse van noch levende, heeft aldaer noch geweest het dorp van korrendamme, gestaen hebbende aen de Westzijde van de nieuwe haven

maer is in Januario des jaers 1613, doordien de Dyken aldaer soo see waren verloopen en genoechsaem doorgevloeit, is de toorn, met de ruyn van de Kerke, mitsgaders het geheele kerkhof en eenige hoogten daar omtrent, in stukken gehakt, en opgedolven, en in de putten van de voorsz. ontramponeerden, en bijkans geinundeerden Dijk, die aldae recht over lach gevoert, en daer mede wederom ter voller aerde gebracht sulcx tegenwoordich maer twee of drie huizen zijn overgebleven."

Hoe veelvuldig het terugtrekken achter inlagen plaats greep kan no blijken uit de mededeeling op blz. 256. "Oude dijkers plachten in noc levende mannen jonkheit te verhalen, dat zij buiten den dijk, die teger woordig aan de zuidzijde is liggende, geweten hadden noch andere di dijken, daer sy aen gewerkt hadden; welke inkortinge in een mans leve was geschiet."

Dat aan deze voortdurende grondbraken Schouwen zijne boogvormig gedaante dankt, blijkt uit een keur door keizer Karel V, op 24 Feb. 153 te Brussel gegeven, in antwoord op de herhaalde beden van Burgemeeste van Zierikzee en van Heemraden van het land van Schouwen (uitvoerd bij Boxhorn, p. 452 en Smallegangen, p. 261). Men leest daar: "dat he voorsz. land over vele jaren zoo ingeschoten en gescheurt heeft, dat voorsz. land, dat te rechte Oost en West strekkende, rond en effe plach te zijn, deur groote grondelooze vallen en afbreukselen, bij inlag etc. dier cause met onsprekelijke inestimabile kosten gemaekt is tott figuere genoech van een halve wassende Mane, strekkende inwaerd ten selven Lande van Oosten Noord-noord-oosten en weder uitwaert at den Lande van Westen Zuid zuidwest, makende een geheele keer of wi linge tegens de nature van stroomen."

Een kort maar treurig beeld van de reeks van rampen waarond Schouwen te lijden had geeft ons Dresselhuis (p. 146) ongeveer als volg "In 1418 werd dit deel des lands reeds zoo beschadigd, dat de Hertz zich de zaken aantrekken en de achterliggende in 1423 gelasten moe het Zuidland ter hulpe te komen. Evenwel na 1475 verloor men inzo derheid vele gronden. Ten jare 1477 had dit plaats bij Zuidkerke Bordendamme. In 1495 legde men, westwaarts van Loockhaven, eet inlage van ruim 547 roeden; in het volgende jaar een andere tot Symme kerke, en in 1498 te Loockhaven wederom eene inlage van 260 roede Ten jare 1505 legde men een inlagdijk van 449½ roeden tot bij Zuikerke; negen jaren later werd dit tot aan de westzijde van gezegde plant voortgezet, ter lengte van 465½ roeden, doch intusschen was in 151 Clauskindereu bij Wester-Schouwen reeds verloren gegaan. — In 151

werd een inlage gelegd van Vrancke Aarnouts inlage tot Cats inlage, lang 258½ roeden. In 1526 legde men eene andere tot 's Heer Arends-ham. In Maart 1533 besteedde men er wederom eene achter Brieskerke, ter lengte van 300 roeden. Een jaar later een andere van 's Heer Arends-ham tot Zuidkerk van wel 800 roeden, en bij welke Brieskerke en Zuidkerke buitengezet werden (Vg. Ermerius Schouwen, p. 52 Bexkorn, p. 452). In 1541 werd er alweder eene verkorting gemaakt van den weklijken bout der laatste inlage, omtrent Zuidkerke, tot den oosthoek denelve bij Brieskerke. — In 1554 werd aan den hoek van Bordendam een inlaagdijk van 198 roeden noodig gekeurd. Doch elf jaren later moest de regeering van Zieriksee al wederom verlof vragen tot het leggen van een inlaagdijk van 1555 roeden lengte, welke aan den dijk van Clauskinderen zou moeten sluiten, en in April van dat jaar voor Vi10.000 werd aanbesteed. (Ermerius, p. 60)."

"Te vergeefs nochthans waren alle deze oposseringen gedaan. Dertien in later, (A° 1568) moest alweder een achterdijk gelegd worden van 4200 roeden, van Berdendam tot Burgtsluis, waarbij het Zuidland bijna gebeel verloren ging. Nieuwe grondbraken hadden in 1580 plaats en een nieuwe inlaagdijk werd in 1588 bij Rengerskerke gelegd. (Tegenw. Stat, II, p. 379). Hetzelsde kwaad had in 1630, 1637 enz. plaats, 200dat in 1648 alweder de vergunning tot het leggen van 2000 roeden daperdijk verleend werd, beginnende van het westeinde der aanwezigen (Emerius, p. 78). Hierbij geraakten de overblijfselen der kerk van Bordendamme onder den dijk, en bleven aldaar verborgen totdat een latere overhaling van den dijk, welke in 1822 plaats had, ze weder ontblootte. (Leeuwsche Volks-almanak voor 1836, p. 75). In 1662 bezweek de inlaagdijk bij Rengerskerke, welke achter het dorp heen was gelegd, waardoor letzelve, met 69 gem., 190 roed. een prooi der golven werd."

Ofschoon de 180 eeuw geene soodanige verliezen heeft aan te wijzen, lad de zuidkust van Schouwen toch ontzettend te lijden van nog in less eeuw voortdurende dijkvallen.

Reeds vroeg schijnt men gedeeltelijk begrepen te hebben waar de torzak dezer rampen schuilde; er staat n. l. aangeteekend: "Soo veel te seer, overmits de stroomen, die vele grooter en swaerder zijn, en sefens den voorsz. lande strengehijker lijden dan de selve plegen te den; te weten, die stroom van de Scheldt........ komende op en is den Lande van Schouwen...... causerende groote wielinge en stheuringe.

Dat het gevolg dezer stroomingen n. l. de plaat in het midden de

rampen nog verergerde blijkt eveneens uit de keur van Karel V. "Ende alsoo de principaelste last den lande van Schouwen toekomt deur eenplate, genaemt de Rocheplate, gelegen tusschen Woeringerzand, en 't land van Schouwen, die den stroom in 't land dringet; so ordonneren wij, dat de Rentmeester, Opper-Dijkgrave, ende Heemraden, deselve plate doen visiteren bij luiden daartoe expert zijnde, of men deselve Rocheplate niet en zoude mogen minueren, ofte bij eeniger manieren den stroom door 't verdronken land van Noord-Beveland te leiden, om alsoo den stroom, die nu in 't land soo seer valt, te diverteren, en soo veel alst doenelijk sal wesen."

De zuidkust van het tegenwoordige Tholen leed aan dezelfde kwaal: oevervallen. Voor Gorishoek lag eertijds een eiland Wulpendal, dat echter reeds vroeg verloren schijnt te zijn. Nog in de 17e eeuw droegen de voorgronden, gewoonlijk de Reep geheeten, nog den naam van de Wulpendalsche schorren. Met uitzondering van de in 1570 en 1720 ondergeloopen polders Broodeloos en Altekleine, welke bij stormvloed verloren gingen, zijn de meeste gronden weer door wegzinking verdwenen.

Gaarne hadden wij de vorming der zeegaten gedurende de laatste eeuwen uitvoerig nagegaan, het voorhanden zijn van talrijke gemeten kaarten in Rijks-, Provinciaal- of Bizonder Archief zou zulks zeer leetzaam doen zijn.

Hiervan afstappende zij het vergund nog met een enkel woord een en ander uit de geschiedenis der Maasmonding aan te halen, tot bevestiging der vooraf geuitte stellingen; voornamelijk wijl ons hiertoe, behalve de hydrographische kaart van 1884, ook die van 1839 en Cruquius kaart van 1733 ten dienste staan.

De geschiedenis van Goeree is uitvoerig behandeld door den tegenwoordigen hoofdinspecteur van den waterstaat Caland. Zooals bekend is stond het eiland Goeree ruim een eeuw geleden nog op zich zelf. Volgens ge- tuigenis van Cruquius had het eiland vroeger meer een strekking Noord—Zuid, waaruit dus weer het afronden, tengevolge van den vloedstroom, blijkt.

De lage dam, welke van Goeree naar Overslakkee, in 1750—52 op aanraden van Cruquius en onder goedkeuring van den hoogleeraar 's Gravezande, gelegd werd ter bescherming van het eiland, had echter klaarblijkelijk een ongewenschten invloed. Hoewel de ingelanden vroeger reeds met dijkvallen in den Oudelandschen Zeedijk (zuidzijde van Goeree) te kampen gehad hadden, werden deze echter na de dichting van Hals en Scharrezee door genoemden kleidam, van meer belang. De gevolgen

na dezen dam waren dus dezelfde als die der dichting van de geulen n Shouwen en Tholen voor deze eilanden. Aanvankelijk werd de dam mu beschadigd, en vorderde aanzienlijke geldoffers. Reeds werd voorgesteld om hem te verlaten, toen men nochthans na ingewonnen advies na den hoogleeraar Lulofs tot verhooging en verzwaring overging (1765). Als natuurlijk gevolg vinden we van 1772 tot 1819, 19 dijkvallen in on Oudelandschen zeedijk aangeteekend, op een enkele na alle gelega in een dijkstuk van ongeveer 1500 meters. Ten noorden van den den heeft daarentegen sterke aanslibbing plaats, zoodat hier reeds in 156 de Adriana pr. gewonnen werd, weldra door andere gevolgd. Vol-Es Cruquius' kaart van 1733 stroomde het water bij eb uit de Krammercht Zuid-Noord op de meridiaan van Goeree en boog dan voor m groot deel bezuiden den Oudelandschen zeedijk naar zee. Vóór het murlijke dijkstuk komen dan ook diepten van 60 Rijnl. voeten voor, ta decle had echter het water gelegenheid zich over de Scharrenzee te tespreiden. Geen wonder dus dat toen het water genoodzaakt werd met poter kracht voorbij te stroomen, vallen hier menigvuldig werden. Uit t hydrographische kaart door A. van Rhijn in 1837 opgenomen, blijkt Le Paardeplaat aan de N.O.-zijde te zijn afgenomen en het Springerdiep mer een strekking Z.O.-N.W. te hebben, zoodat het water meer tegen den oever aanloopt.

Het is opvallend hoe zoowel de zuidkust van Goeree als die van Schouwa door dijkvallen geleden hebben, terwijl de bolle noordzijden dier tinden wel door dijkbreuk bij stormvloeden doch nimmer door oevertilen verloren hebben. Zou het beloop dezer kustlijnen ongeveer die in welke door den vloedstroom bedongen wordt? Men zou met het in op de eenvormigheid dezer kustgedeelten geneigd zijn dit aan te zemen, vooral wanneer men opmerkt, dat in hoofdzaak deze lijnen in it laatste eeuwen onveranderd zijn.

Merkwaardig is nog de analogie tusschen Ooster Schelde en het zeezet van Brouwershaven. Beide bezitten de groote middenplaat, de diepe
roedgeul onder den zuidwal binnenwaarts doodloopende in de snel verchietende gronden, respectievelijk van Vuilbaard en Kabiljauwsche plaat,
te ebgeul onder den noordwal naar zee doodloopend in de Banjaard en
tet Oosterzand, in welke beide nog enkele ondiepe, naar N.W. doodtopende geultjes.

Bizonder opvallend is de verandering, welke het zeegat van Goeree anderhalve eeuw ondergaan heeft. De opname van Cruquius uit 1731 32 vertoont binnengaats geen enkele ondiepte. De diepte bedraagt gemiddeld 30 Rijnl. voeten. Wel is reeds een langgerekte, smalle onge veer Z.O.—N.W. strekkende *Hinder* aanwezig, voor een klein gedeelt bij eb droogvallend en door de *Spleet* of het *Quaksdiep* (15 R. v.) van Voorne gescheiden. Volgens Cruquis kwamen toen ter tijd de grootst diepten reeds voor onder den Goereeschen wal.

Op de hydrographische kaart van A. van Rhijn (opuame 1839) lig de vaarweg nog immer aan de zuidzijde. Aanvankelijk bij Hompel et Bol treft men een buitendrempel aan, waarop slechts 40 palm wate staat, daaraan sluit zich het Westgat met een diepte van 50 palm et meer (tot 90 palm toe). Bij den Kwadenhoek buigt de vloedgeul, altije dicht onder den zuidwal, in het Zuiderdiep (100 palm) en loopt das langs Stellendam tegen Slijk en Meneersche plaat dood. In het verlengd van het Westgat stuit men op een binnen ondiepte de N. Pampus welke ook van het nagenoeg recht Oost-West strekkend Bokkegat de toegang tot het Haringvliet opent. Deze ondiepte is het noordelijk uit einde van een analoog Rogge-, Neeltjes-Jans-plaat gevormde droogt n. l. de Scheelhoek. Aanvankelijk schijnt deze plaat één ondiepte 1 hebben gevormd met de Slijk en Meneersche platen vormende aldus ee scheiding tusschen vloed en ebgeul, althans vóór 1845 was dit N.-Pamps de eenige weg om wanneer een schip over de buitendrempel in Wes of Bokkegat gekomen was het Haringvliet binnen te zeilen. In genoem jaar heeft men echter gemerkt dat het Zuid-Pampus onmiddelijk te zuidoosten tegen de Scheelhoek grenzende, ook geschikt was voor groot schepen. Het is toen betond en bebakend en in 1850 hadden beid gelijke vaardiepte 38 palm.

Sedert een eeuw hebben zich dus twee geulen gevormd het Haring vliet of ebgeul onder den wal van Voorne, binneuwaarts vrij, naar ze eindigende in de platen de Bollen, de Hinder en de Zeehonden, de hier tusschen liggende geulen de Noorder en de Ribben hebben weinit te beteekenen en werden slechts door kleine visscherschepen gebruikt thans zijn zij geheel verlaten. (Beschrijving Nederl. Zeegaten Deel III 1887). De tweede geul is de vloedgeul, Westgat en Zuiderdiep, onde den wal van Goeree, binnen doodloopende tegen Meneersche en Slijl plaat, naar zee veel verder doorloopend en slechts door geringen buiter drempel afgesloten.

De scheiding tusschen beide geulen wordt gevormd door de verschilende ondiepten, samen uitmakend den Hinder, N.-Pampus, Scheelhoek Z.-Pampus, Zuidwal, Slijkplaat, en Meneerscheplaat. Zij is dus aan dzeezijde het breedst en verbonden aan den wal van Voorne, binnes

gats onder een scherpenhoek vast aan den wal van Overslakkee. Dat ook inderdaad het Haringvliet, de ebgenl, het rivierwater afvoet zegt de Heer H. Greve ingenieur 1º klasse van den Waterstaat (Bekroonde Verhandeling over het Zeegat van Goedereede N. Verh. v. h. Bataafsch Genoots. te Rotterdam, 1851, p. 38). "De geul tusschen de Meneerscheplaat en den oever van Middelharnis is smal en ondiep, zoodat die plaat, vooral met betrekking tot het asvoeren van rivierwater, gerekend kan worden verbonden te zijn aan den vasten wal van Middelhamis."

Het midden van den rug tusschen de beide geulen de Scheelhoek neemt meer en meer een zelfstandig karakter aan, omdat de vloedstroom ook hier tracht te wielen, zooals aan den zuidelijken oever van deze plaat merkbaar is. ;,In 1839 bedroeg zij (de Scheelhoek) reeds de helft der rivier en sedert dien tijd is zij in grootte en vooral in hoogte toegenomen zoodat bij laagwater zich reeds een gedeelte boven vertoont." (Greve, p. 37). Ook vermeldt dezelfde schrijver (p. 40) "In het gat van Goeree valt de vloedstroom om de Zuid vroeger in, voordat nog de ebstroomen in de zeegaten en van om de Noord komende, hebben opgelooden," waaruit dus blijkt hetgeen wij in den aanvang van dit opstel over de getijstroomen zeiden.

Volgens de hydrographische kaart door het departement van Marine in 1885 uitgegeven, ligt de vaarweg nog altijd onder den Zuidwal, doch beeft zich vooral aan zijn monding meer noordwaarts verlegd, zoodat de ingang nu door het Slijkgat loopt. Het Zuiderdiep is door de aanzienlijke uitbreiding van de Scheelhoek, die nagenoeg geheel droogvalt, zeer versmalt, toch komen hier nog de groote diepten voor. Binnenwaarts loopt het tegen de snel verschietende gronden van Slijk- en Meneersche plaat dood. Van het geultje het Aardappelengat waarin de vloedgenl uitloopt zegt de "Zeilaanwijzing" van 1887: "Daar de gronden hier aan verschuiving onderhevig zijn wordt de betonning telkens verlegd en verandert de diepte er ook nog al in."

Ook de ebgeul Haringvliet en Rak van Scheelhoek zijn aanzienlijk vermalt. Evenals Slijkplaat en Scheelhoek hooger en grooter zijn gevorden, zoo is ook Z.-Pampus van 36 palm in 1837 op 18 palm en M.-Pampus van 40 tot 26 palm verondiept, ja even benoorden het N.-Pampus is zelf een droog vallende plaat gevormd. Het Noordergat en de Ribben welke vroeger nog gelegenheid tot uitzeilen gaven aan visters zijn geheel verloopen, slechts het ongeveer Noord-Zuid in diepten van 20 d. M. verloopende Nieuwegat vormt nog een onbeteekenende

voortzetting van de ebgeul. Van de kust van Voorne strekt zich dus westwaarts een ondiepte uit tot op 58' bewesten Amsterdam en 51° 52' N. Br. waarvan de zuid-oostelijkste punt, zich naar zee waaiervormig uitspreidend, bij eb droogvalt.

Wij zien dus hier in betrekkelijk korten tijd een verondieping van de noordzijde door den ebstroom. Langzamerhand breidt de noordwal zich zeewaarts uit, evenals zulks is waar te nemen aan Springer en Ooster bewesten Goeree en in nog sterker mate aan den hoek van Holland, welke volgens de kaarten geheel hierdoor gevormd is. Het is deze landvorming ten eenent door den ebstroom, doch hoofdzakelijk de afronding van den zuidwal door den rechtsdringenden vloedstroom, welke de zoo opvallende overeenkomst onzer zoogenaamd "vloedscheppende" zeegaten vormt. De reden der betrekkelijk zoo snelle vervorming van een riviermond tot zeegat van de opening tusschen Voorne en Goeree is, zooals reeds gezegd werd, een te geringe rivierafvoer in verhouding tot de wijdte der opening.

Ook Caland V. K. I. I. '67—68 merkt op: "De verdrooging van het. Goereesche gat is een gevolg van de sedert 1855 zooveel sterkeren afvoer van ebwater over de vlakte van Ooltgensplaat naar het Krammer."

De hoofddenkbeelden uit de voorafgaande bladzijden hebben zich ook in de laatste jaren uit de geschiedenis van den Nieuwen Waterweg bewaarheid. Het niet onderscheiden tusschen riviermond en zeegat, hetwelk in menige zinsnede van het Rapport van den Raad van Waterstaat, ingesteld bij Besluit v. d. Min. v. Binn. Zaken van 5 Nov. 1857 doorstraalt, is oorzaak geweest der aanvankelijk minder bevredigende uitkomsten van een werk, welks hoofdgedachte juist is. Immers de zoogenaamd vloedscheppende vorm, welke aanvankelijk aan den N. Waterweg gegeven werd door de richting van de as en de geringere lengte van den zuiderdam, is ontleend aan den toestand der zeegaten, waar, zooals wij gezien hebben, de vloedstroom direkt, de ebstroom door verondieping ten noorden indirekt, den vloedscheppenden vorm veroorzaken. In een riviermond moet daarentegen de vloedstroom uit zee zooveel mogelijk buitengesloten worden. De betrekkelijk geringe wijdte tusschen de dammen en nog meer die der doorgraving, benevens de afdamming van den mond van het Scheur de Pan genaamd, en het leiden der Maas in de doorgraving wijzen er op dat het verkrijgen van een riviermond bedoeld was. De achtereenvolgende hydrographische kaartjes vooral die kort voor het verlengen van dezen zuiderdam en het leggen van den lagen binnendam,

Instreeren vrij duidelijk hetgeen hier gezegd is over de getijstroomingen en hunne geulen.

De schitterende resultaten der laatste jaren hebben echter bewezen, be juist de hoofdgedachte was, en het valt te roemen dat in een tijd, toen men Rotterdam's zeeweg slechts door dammen en kanalen op en om Goeree trachtte te verbeteren, het stoute en geniale plan gevormd is tot heropening van den ouden Maasmond.

In deze eeuw is op zoo menig gebied met succes de natuur de duimschroeven aangelegd, mits het met beleid geschiedde, dat het wenschelijk schijnt ook het experiment op waterbouwkundig of hydrographisch gebied aan te wenden.

Een model b. v. op schaal 1:25000 van een onzer zeegaten, waarin langs kunstmatigen weg getijen worden veroorzaakt, zou binnen korten tijd een deel dier verschijnselen doen zien, welke de natuur zelve eerst na veel onderzoek en eeuwen aan den dag brengt. Het kan aan geen twijfel onderhevig zijn, dat hieruit, in verband met bestudeering der bestaande toestanden, de nuttigste gevolgen voor de praktijk te trekken zijn. Met te meer vertrouwen durven wij dit aanbevelen nu het blijkt, dat den experimenteelen weg reeds door L. F. Vernon Harcourt voor de Seine en door Prof. O. Reynolds voor de Mersey met goed gevolg is ingeslagen (zie Nature, Febr. 28, p. 430).

Daarnaast zou een wetenschappelijk onderzoek der sediment-vorming in onze zeegaten en riviermonden, vooral met het oog op de rotatie-kracht en de behandelde eigenschap van zeewater, veel licht kunnen verspreiden.

Verkort Verslag over de Openbare Werken in Nederland in 1888.

Dit jaar onderscheidde zich door niets, dan door de bijna buitengewone bijzonderheid, dat geen enkel ongeval van belang ons land teisterde; noch verwoestende stormvloeden, noch vernielende dijkbreuken, noch zorgbarende ijsopstoppingen joegen onze landskinderen schrik aan. Het was derhalve een in dit opzicht gezegend jaar, en toch.... toch vorderden de openbare werken groote uitgaven, gelijk het volgend Overzicht duidelijk aantoont:

Kosten van aanleg, verbetering en onderhoud der Bijks Waterstaatswerken in 1888.

RUBRIEKEN.	AANLEG EN VERBETERING.	ONDERHOUD.
1. Rivieren	f 3,200,014.—	f 682,412.—
2. Kanalen	,, 2,620,340.—	,, 972,015.—
3. Groote wegen	" 59,444· 	,, 628,830 —
4. Havens	,, 150,307.—	,, 81,237.—
5. Zee- en oeverwerken	" 105,597.—	,, 253,055.—
6. Veren, schipbruggen, enz	" 16,108.—	,, 30,626.—
7. Storm- en winterschaden	f 11,733.—	

Behoeven wij wel te herinneren dat onder deze cijfers niet begrepen zijn, die voor aanleg van Spoorwegen en de groote sommen die door Provinciën en Gemeenten, en vooral door Polderbesturen zijn ten koste gelegd aan onderhoud van het bestaande en aan verbetering en aanleg van wegen en vaarten.

Het belangrijkste dat het Rijk heeft ondernomen en voltooid zullen wij hier met een enkel woord gedenken en daartoe de verschillende rubrieken doorloopen.

I. Rivieren.

De laagste waterstand op onze hoofdrivier de Waal kwam voor op den 7en Maart, 1¹/₃ M. beneden den middelbaren rivierstand, daarentegen werd de hoogste waterstand waargenomen op den 2en April, 3¹/₃ M. boven den M. R. stand. Buitengewone hooge waterstanden kwamen op onze rivieren in 1888 niet voor.

De scheepvaart ondervond bijna geen vertraging door lagen stand en het mag weleens herinnerd worden dat in December op den Duitschen Rijn boven Emmerik nagenoeg even weinig vaardiepte werd aangetroffen als op de Waal bij Varik, waar de Duitsche naburen 200 over klagen.

De dagelijksche stoombootdiensten tusschen Arnhem en Nijmegen en Amhem en Rotterdam konden geregeld plaats hebben. Te Gorinchem ontstond alleen eenige belemmering, welke werd opgeheven door aanzienlijk baggerwerk bij Woudrichem.

De Maas was ook minder grillig van stand dan doorgaans het geval is, alleen boven Roermond ondervonden geladen schepen wel eens vertraging.

Het ijs heeft zich bijna nergens vastgezet, alleen op enkele benedenrivieren kwam dit voor korten tijd voor, doch evenwel veroorzaakte het drijfijs belemmering, o. a. in Januari en Februari op Rijn en Waal, minder veelvuldig op den iJsel, maar veel langer, zelfs tot diep in Maart, op Zwolsche diep en Zwarte Water. In 't begin van Januari en van Februari zat het ijs op enkele beneden-rivieren vast, zoodat boven Rotterdam de scheepvaart eenige belemmering ondervond; ook op de boven-Maas had hetzelfde verloop plaats.

De stormvloeden deden geen noemenswaardige schade ontstaan, ofschoon de Dronther- en Kampereiland-dijken overliepen.

Van de werken vermelden wij aanzienlijke uitbaggeringen van de Waal, waardoor ruim een millioen M³ werd weggeruimd. De grillige gesteldheid van den rivierbodem bij Gorinchem vorderde vrij wat zorg, zoodat het wegbaggeren van 234,000 M³ noodig was om de doorgaande vaargeul te herstellen, maar de zandverplaatsingen zijn nergens zoo menigvuldig als op de breede Merwede.

De Nieuwe Merwede vraagt ook vrij veel bemoeienissen; in 1888 werd rum 1¹/₄ ton gouds ten koste gelegd om ongeveer 500,000 M³ te baggeren en den loop te regulariseeren door kribben en dammen.

De overbrugging van de Oude Maas (geen rijkswerk) werd voltooid.

De 3 M. diepe vaargeul (onder A. P.) bleef in stand; minder regelmatig was het gesteld met het vaarwater door het Hollandsch diep; hier hebben telkens grillige uitschuringen en vorming van zandplaten en drempels plaats, toch bleef Dordrecht tamelijk goed genaakbaar voor zeeschepen.

Het blijkt dat de grootste hinderpaal voor de scheepvaart in den Rijn beneden Renen eindelijk uit den weg was geruimd.

De Nieuwe Waterweg van Rotterdam bleef uitnemend voldoen, doch niet anders dan ten koste van veel overleg en veel uitgaven; steeds vonden belangrijke baggerwerken plaats, met name tusschen Vlaardingen en Maassluis, en aan de monding werd zelfs ruim 900,000 M³ weggeruimd, waarvan twee derden op meer dan 17 M. diepte in de Noordzee werden gelost. In Juni 1888 werd het opruimen van grond uit den Nieuwen Maasmond tot Ult. October 1890 voor anderhalf millioen gulden aanbesteed. Voorts kostte eene verruiming van het Scheur nog f 328,800.—, terwijl de verhooging van het Noorderhoofd f 78,600.— vorderde.

In 1888 zijn den nieuwen weg in- en uitgevaren:

8,135 Stoomschepen,	met	een	inhoud	van	14,478,334 M³.
1,353 Zeilschepen,	"	,,	"	٠,,	1,237,178 "
3,383 Visschersvaartuige		,,	"	"	587,370 ,,
12,871 Schepen	"	"	"	,,	16,302,882 M ³ .

Hieronder waren 892 met meer dan 55 d.M. diepgang, zoodat Rotterdam te recht eene uitnemende zeehaven kan worden genoemd.

Onder alle baggeringen in onze groote rivieren trekt ook met name de aandacht dat uit den IJsel bij Westervoort 5600 M³. harde grond werden verwijderd; de minste vaardiepte op deze rivier was in 't afgeloopen jaar 1,30 M. Het Zwolsche diep werd tot op 2 M., en het Zwarte Water tot op 2,20 M. diepte gebaggerd.

Omtrent de Boven-Maas kan worden vermeld dat het vaarwater veel verbeterde. De doorsnijding van den Piekenwaard boven Driel werd voltooid en evenzoo de daarmede verband houdende normaliseering der rivier.

De verlegging van den Maasmond vorderde eene uitgaaf van 9½ ton door stroomleidende dammen verbeterde de waterafvoer nu reeds, en om de bedding der nieuwe rivier te vormen, werden 1,386,500 M³. grond verzet door 2 excavators, en 132,000 M³. per kruiwagen en met de schop. Nu de gronden bij Heusden rijkseigendom zijn geworden kon de aanbesteding van het bovenste vak voor £282,992.— plaats grijpen.

In verband met deze werken zijn de Heerewaardensche overlaten door verhooging beteugeld.

II. Kanalen.

Het onder profiel herstellen van de Zuid-Willemsvaart in Noord-Brabant kostte f 163,800.—; ook werden vele sluizen verbeterd en de elektrische dienstgeleiding langs het kanaal van Luik tot Crêvecoeur aangelegd. Door het ijs werd de gemeenschap gedurende 35 dagen gestremd. De Dieze werd verbeterd door het opruimen der hinderlijke ondiepten; ruim 15000 schepen en stoombooten werden in 1888 aan den mond geschut.

Dat de Veluwsche kanalen, met name dat bij Dieren niet overvloedig water ontvangen, blijkt uit de opgave dat het kanaal er gedurende 182 dagen onder peil was; toch bedroeg de gemiddelde toevloeiing uit de zes sprengen (waarvan de Zwaanspreng het meest leverde) per etmaal gemiddeld 19,280 M³.

Het Noordhollandsch kanaal werd met zorg onderhouden.

Meer uitgaven vorderde het Noordzee-kanaal; alleen de vervaardiging van betonblokken voor de hoofden kostten f 16,000.—, de baggerwerken in haven en buitenkanaal f 169,400.—, waarvoor ruim 450,000 M³. grond werden verplaatst, doch daardoor steeg de gemiddelde diepte tot 84,4 d.M.

Aan de Noordzee-sluizen werden geschut 3463 Schepen, waaronder 380 met meer dan 55 d.M. diepgang.

Het maken van de groote nieuwe sluis werd voorbereid door het wegruimen van 1,383,000 M³. grond voor f 348,500.—, terwijl bovendien 10g 678,000 M³. kosteloos door particulieren werden weggehaald.

ledereen weet dat het kanaal ter verbinding van Amsterdam met de Merwede nog in het geheel niet voltooid is, deels doordien zulke werken veel overleg en tijd vorderen, deels omdat processen, onteigeningen en onderhandelingen daarbij in het spel zijn. Evenwel bedroegen de uitgaven ruim f 1,783,000.—, een bewijs dat niet werd stilgezeten en er voortgang wordt gemaakt. De Syphon bij Zeeburg vorderde alleen f 569,000.— en het gedeelte kanaal tusschen Nichtevecht en Breukelen werd aanbesteed voor f 1,611,900.—

Dat de verbeteringen bij Terneuzen aangebracht aan het Gentsche kanaal niet vruchteloos waren, bewijst het aantal der aan de Stationskade aldaar geloste en geladen Stoom- en Zeilschepen: 519 met 1,099,208 M³. bruto inhoud. De gemeente Utrecht verbeterde den Leidschen Rijn in verband met de omlegging der Keulsche vaart.

Tal van verbeteringen werden aangebracht aan verschillende kanalen van minderen rang, en Friesland vervulde hierbij den hoofdrol; de kanaliseering van den Tjonger en het verdiepen en verbeteren van de zijtakken bekleedden daarin de eerste plaats.

Het kanaal van Almeloo naar Nordhorn aan de Eem is geheel voltooid op ons gebied, maar treurig is het dat Pruisen niet aan de belofte voldoet om het verder door te trekken!

Steeds werd gearbeid aan de vereeniging van het Oranjekanaal met de verlengde Hoogeveensche vaart, welke sedert tot stand kwam.

IIL Wegen.

In 1888 werd de Spoorweg Waalwijk - Vlijmen geopend, zoodat van de geheele lijn, van Zwaluwe af, ruim 40.000 M. in gebruik zijn; aan het laatste gedeelte, naar 's Hertogenbosch, wordt voortdurend gearbeid, en de aardenbaan voor f481,000.— aanbesteed.

Noodwendig vorderen de bestaande Staatslijnen steeds verbeteringen en onderhoud; daarvan valt in 't oog het leggen van eene tweede spootbaan van Kruiningen tot Middelburg ten behoeve van het snelle internationaal verkeer.

Dat door de Holl. Spoorweg-Maatsch. krachtig werd gewerkt aan de vernieuwing der Stationgebouwen te 's Gravenhage en Schiedam is bekend.

Hiernevens volgt eene opgave van het verkeer op de onderscheidene lijnen.

NAAM DER ONDERNEMING.	Lengte	Afgelegde trein-	I TVLVV	AANTAL REIZIGERS.	Aantal ton vervoerde goe-
	kilometers.	kilometers.	Enkele reis.	Retourbiljetten.	1000-tallen.
Maatschappij tot Exploitatie van Staatsspoorwegen	1,888*	10,881,016	8,987,147	2,408,861	000'89
Hollandsche IJzeren Spoorweg-Maatschappij	701•	5,548,745	1,684,769	6,467,868	14,000
Van Nijmegen naar Kleef (in Nederland)	14.	140,088	28,237	109,688	02
Nederlandsche Eijnspoorweg-Maatschappij.	\$87	8,268,934	8,847	8,847,650	(*00%
Grand Central-Belge (in Nederland)	108	402,088	4,78	4,720,561	\$08,000*)
Luik-Masstricht (in Nederland)	n	161,156	448,992	8,716	008
Nederlandsche Centraalspoorweg-Maatschappij	108	587,512	808,680	178,162	2,500
Links Rheinische (Zovensar-grens)	ъ	i	18,928	15,288	800
Torneuzen-Mechelen (in Nederland)	*88	4,840,9701)	89,078	2,175	I
Noord-Brahantsch-Duitsche Spoorwegmaatschappij	.89	269,977	49,582	64,531	009
Bochts Rheinische (Venloo-grens) ,	*	28,780	8,852	18,618	70
Nieuwe Schans-Ihrhoven (in Nederland)	1	8,268	25,366	5,844	90
Bergisch-Märkische (Winterswijk-grenzen)	111	78,100	8,878	18,862	8,500
Haarlem-Zandvoort	11	82,608	27,556	87,173	i

2) Alleen binnenlandsch verkeer. 1) Blijkbaar over de geheele lijn, tot Mechelen. 3) Dit cijfer heeft betrekking tot al de lijnen dezer groote Spoorwegmaatschappij.

Niet onbelangrijk is eene vergelijking bijv. van het aantal retourbiljetten op de Hollandsche lijnen, hetgeen tot bewijs kan strekken dat de meeste reizigers zich voor zaken verplaatsen, en zich reppen om weder thuis te komen. — Uit het aantal afgelegde treinkilometers schijnt men te kunnen opmaken dat de Rijnspoorweg Maatsch. hare lijnen het drukst exploiteerde. — Het verkeer te water blijkt in Holland de concurrentie tegen den Spoorweg nog zeer goed vol te houden; men ziet dit uit de laatste kolom. — Andere opmerkingen willen wij ditmaal niet maken.

Het moeilijke werk om het centraal-station te Amsterdam in gebruik te kunnen stellen, vorderde veel zorg en beleid maar werd niet voltooid in 1888. Evenzoo was het gesteld met de belangrijke werken op het knooppunt te Geldermalsen. Eindelijk nadert het oogenblik waarop Nijmegen van een dringend noodig definitief station zal worden voorzien; een nieuw ontwerp werd althans ingezonden.

Veel bezwaren ontmoet de aanleg van den Spoorweg naar den Hoek van Holland, wegens aanhoudende verzakkingen in den slappen bodem bij Vlaardingen en tal van lastige kunstwerken; aan den Hoek zelf werden 323,490 M³. grond verwerkt.

De lijnen der Kon. Nederl. Locaal Spoorweg Maatsch. "Koning Willem III" in Gelderland en Overijsel kwamen geheel gereed en in exploitatie; zij voldoen uitnemend aan de verwachting en zullen nog winnen bij meel geregelde aansluiting aan bestaande Spoorwegen; de aanvankelijke hinderpalen zijn thans grootendeels uit den weg geruimd; merkwaardig maal niet aangenaam waren de plagerijen waarop in den aanvang de reizigers, o. a. te Dieren en te Apeldoorn, vergast werden.

Zoo zijn wij als van zelf tot de tramwegen genaderd en daarvan werden voltooid: die van Eindhoven naar Geldrop (kostte f60,000.—); — het gedeelte Velp—Dieren van de Geldersche Stoomtram Maatsch.: — van Loosduinen naar het strand en zeebad; — de paardentramweg van Hoorn naar Enkhuizen langs de dichtbevolkte "Streek"; — idem van Venloo naar Steil; — aanzienlijke verbeteringen van de bestaande tramwegen te Utrecht en 's Gravenhage.

Wat betrest de gewone straat- en kunstwegen bepalen wij ons te wijzen op het allerbelangrijkste dat tot stand is gekomen: een keiweg tusschen Bokstel en Liempde; d⁰. onder Gilze; d⁰. onder Oosterhout; een kunstweg van Steenderen naar Doesburg; een keiweg tusschen Oostburg en St. Kruis; uitgestrekte grintwegen in den Groninger Eemspolder; een kunstweg van Nieuw-Buinen over Buinen naar Borger; een d⁰. van Schinveld naar Ubach-over-Worms; een d⁰. door Margraten naar den pro-

vincialenweg in Limburg; voorts tallooze verbeteringen en verbindingen. Het beplanten met vruchtboomen begroetten wij hier en daar met voldoening.

IV. Werken voor uitwatering.

Dat dit onderdeel der openbare werken van het hoogste belang is in ons waterrijk land, veel geld en veel hoofdbreken kost, kan iedereen bevroeden. Men ziet dan ook overal stoomgemalen bouwen, sluizen verbeteren, vaarten uitdiepen, doch dit geschiedt ook zeer dikwijls voor metening van Waterschappen, Gemeenten en Provinciën, doorgaans met en soms zonder rijkssubsidie.

Stoomgemalen werden onderanderen gebouwd: voor den Prinslandschenpolder, voor het Velperbroek, voor een polder onder Wateringen,
voor den Buiksloterham; het Heemraadschap van de Eem bracht de beken om Amersfoort onder profiel en verbeterde den afvoer op afdoende
wijze; de Gemeente 's Gravenhage voltooide de werken der Waterverversching en maakte een begin met de spuiing door opmaling en ook
door natuurlijke suatie; het Waterschap van de Linge ondernam eene verbetering van de afwatering, en het Waterschap Hunsingoo deed hetzelfde.
Men kan dus in dit opzicht gerust zijn, van stilzitten is geen sprake.

V. Havens.

Wageningen voltooide zijn haven, Rotterdam gaat rusteloos voort zijne schoone havens te verruimen, te verbeteren en te vermeerderen, in Enkhaizen werd de Zuiderhaven voor aanzienlijke sommen vergroot en verbeterd; te Amsterdam vormde men eene nieuwe petroleumhaven; zoowel in als bij Harlingen werden vrij belangrijke werken uitgevoerd om de saven toegankelijk te houden voor schepen van 4—5 meter diepgang; de aanleg van havenhoofden te Lemmer werd voltooid en vorderde van intswege ruim 4 ton; ook voor het diephouden van de haven te Delfzijl werd gezorgd.

VI. Waterkeerende Werken.

Deze zijn wel van het allermeeste belang voor ons door het water bedreigd land; regeering en besturen werken dus samen om dien beigen buurman te keeren, zoowel binnenslands wat het rivierwater betit, als langs de aan stormvloeden blootgestelde kusten. Allerwege widt zonder ophouden aan beveiliging, onderhoud en herstel gearbeid,

op honderde plaatsen zien wij de deskundigen peinzen en ontwerpen de kloeke werkkrachten zich inspannen om alle gevaar te voorkomen.

De volgende werken vielen ons in 't oog:

De Waaldijk werd verzwaard en verhoogd onder Puislijk en Druten alwaar ook de uiterwaardschen kaden werden versterkt.

De zuider Lingedijk onder Asperen en Spijk werd verbeterd.

De Struitsche zeedijk van Voorne werd bevestigd.

De Nieuwe Neuzenpolder zag zijne dijkwerken versterken.

De Eendrachtpolder en een paar naburige polders in Zeeland eischte vrij wat uitgaven.

De Lekdijk-Benedendams werd krachtig versterkt.

De Blankenhammerzeedijk en de zeedijk benoorden Harlingen onde gingen afdoende verbeteringen.

Met groote belangstelling volgen wij de waarnemingen langs de kuste van vasteland en eilanden, immers met voorbeeldige zorg wordt gemeiten hoeveel de duinvoet op een aantal plaatsen toe- of afnam, of choogwaterlijn duin- of zeewaarts is verplaatst, de duinvoet verlaagd verhoogd is; dit alles levert voor een enkel jaar zeer afwisselende, ja ze grillige uitkomsten, maar het is niet te loochenen dat er na verloof van jaren een schat van wetenschap uit te putten is, nopens het verloop onzer kusten, want niet overal is het zoo duidelijk dat een voor woekering van de zee naar het oosten plaats grijpt, als op het eilaar Rottum, waar alweder eene nieuwe voogdswoning meer oostelijk moe worden gebouwd om reden de zee de vorige sterk bedreigde.

Dat het bevestigen der duinen met helm en stroo jaarlijks flink word voortgezet en vrij wat geld kost, blijkt uit de officieële opgaven, di naar wij vurig hopen eenmaal zullen behelzen, dat eene beplanting as de binnenhelling met eene of andere dennensoort is gelukt; thans va op de enkele genomen proeven, evenmin als op de uitkomst, te roeme

VII. Landaanwinning (en ontginning).

De met bekwamen spoed en ferm beleid tot stand gekomen Heidt maatschappij zal ons stellig binnen niet al te lang tijdverloop, met uil nemende resultaten verblijden, thans ziet het er nog zeer kalm uit odit gebied, met name in 1888.

De ontginningen in het Helenaveen onder Deurne leverden 286.13 ton lange turf en 154,763 ton afval, benevens 28 millioen K.G. turf

stroisel, terwijl dit laatste artikel ook te Deurne zelf in een paar fabrieken werd bereid.

De dam in het Slaak, met zijne slijkvangers, hield zich zeer goed.

De aanhechting van Ameland aan den vasten wal door middel van een kunstmatigen dam, zal weldra een stuk der historie zijn; er wordt ziets gedaan om het nog aanwezige te behouden.

In het Drentsche Griendtsveen achter Emmen zijn 340 H. A. veen aan de snede; behalve eene massa turf werden verzonden ruim 38 milieen K. G. turfstrooisel. Meer valt van dit onderdeel niet te vermelden, das een schrale oogst!

VIII. Landsgebouwen, waterversorging.

Belangrijke nieuwe gebouwen verrezen niet, zooveel te meer plannen, incwel veelal op papier gebracht, bleven in de lucht zweven, als wasten het Spaansche luchtkasteelen, en toch mogen zij dat niet wezen; mi noemen de gerechtsgebouwen in de residentie, waar thans alleen het kantongerecht op betamelijke wijze is ingericht, doch Hooge Raad, Geschtshof en zelf Arrondissements-Rechtbank eene schrille tegenstelling warmen met het prachtige Regeeringspaleis van Justitie; het schijnt dat ist alle beschikbare penningen heeft verzwolgen; voorts wijzen wij ook op de plannen om het post- en telegraafgebouw te Amsterdam naar eisch in te richten. Waartoe meer genoemd? Toch wenschen wij nog te wijzen op het Gerechtshof te Amsterdam en op het Departement van Bintenlandsche Zaken te 's Gravenhage als curieuze voorbeelden van oversteven zuinigheid of van eene berooide schatkist.

De waterverzorging neemt op een aantal plaatsen veler belangstelling in beslag; afdoend geholpen werden in 1888: Rozendaal (in N.-Br.) alwaar de werken f 140,000.— kostten; Zutfen; Kralingen; Oud-Beierland; Nieuwer-Amstel; Soest, Baarn en Hilversum; Leeuwarden; Kampen (1001 f 327,000.—) en Venloo (f 150,000.—), terwijl de Vechtwaterleiding aan Amsterdam groote diensten bewijst, maar dan ook ongeveer millioen gulden kostte.

Ons overzicht besluiten wij met eene mededeeling der resultaten van de meteorologische waarnemingen te Helder bewerkstelligd; zij zijn even wivoerig als belangrijk, maar voor ons doel is een kort uittreksel ongebrijfeld voldoende.

De grootste winddruk in 1888 werd waargenomen op 20 November

ten 7 u. 10 m. nam. = 80 K. G. op den M². Op geen anderen datur werden winddrukken boven 60 K. G. geobserveerd. De geringste winddruk kwam voor op 9 en 16 Juni.

De hoogste barometerstand werd waargenomen op 13 Januari voorm 11 u. 36 m. = 779,8 mM. en de laagste op 12 Maart voorm. 5 u. 30 m = 732,3 mM. Gedurende 48 dagen werden standen waargenomen hooge dan 770 mM. en op 18 dagen lager dan 745 mM.; de gemiddelde bis rometerstand bedroeg 760,41 mM. of 0,25 boven den normalen stand De maximum temperatuur vond plaats op 19 Mei nam. o u. 54 m. = 24,9° C. en de minimum op 2 Februari voorm. o u. 24 m. = -9,3° C. de gemiddelde uitkomst was 8,08° C. Dat is 1,84° C. beneden een normaal jaar.

De magnetische declinatie kromp tot 15° 30′ 27″ ten westen, 's mid dags ten 2 ure waargenomen.

Het aantal regendagen bedroeg te Helder 165, waarop 597,6 mM regen viel; in Maart, Juli en October viel verreweg het meest, bijna d helft van het totaal, in Mei, Juni en Januari het minst, nauwelijks ee tiende van het geheele bedrag.

Eindelijk werd de hoogste vloed waargenomen op 21 November de voorm. 8 u. 15 m. = + 1,474 M. en de laagste eb op 14 Maart des nam 2 u. 30 m. = - 1,746 M.; het gemiddeld verschil tusschen vloed en el is in het Marsdiep = 1,138 M.

Den Haag, Nov. 1889.

J. KUYPER

Koloniaal Verslag van 1889.

Oost-Indie.

Weder laten wij uit dat verslag hier een en ander volgen, dat als van aardrijkskundig belang kan worden geacht.

Voor de Oppervlakte van Java en Madura, kan naar het vorig verlag worden verwezen; die der zoogenaamde Buitenbezittingen wordt,
schter meerendeels volgens zeer globale gegevens, ook nog steeds gelat op 27,820,9 vierk. geographische mijlen. Daarin zal echter eenige
remeerdering ontstaan, tengevolge der opneming onder Nederlandsch
lag van eenige streken in de Batta-landen (Midden-Sumatra) en op
Celebes van het rijk Wadjo in de golf van Boni en van enkele kleine
statjes o. a. Todjo in de golf van Tomini.

Bevolking van Nederlandsch-Indië in 1887.

	JAVA EN MADURA.	BUITEN- BEZITTINGEN.	TOTAAL.
ropeanen en daarmede			
gelijkgestelden, zonder le-	5.55		
ger en vloot	41,638	10,898	52,536
Arabieren, behalve op Bali	232,683	183,817	416,500
en Lombok	13,205	6,293	19,498
	2,893	6047	0 9 40
lingen	22,139,624	6,947	9,840
analiders	22,139,024	1	r
Dit geeft boven 1886 eene			
Voor Europeanen enz. van	1,291	453	1,744
or Chineezen van	7,110	13,380	20,490
Voor Arabieren van	509	163	672
oor andere vreemde Oos-	,		
terlingen van	126	631	757
Toor Inlanders van	423,447	7	?

Dus in alle categorieën toename der bevolking, voor de inlanders of Java en Madura nagenoeg $2^0/_0$, waarin ditmaal alle gewesten in meer dere of mindere mate deelen; ook Bantam, dat echter het eenige gewest van Java is, alwaar in het laatste decennium merkbare afnemin der inlandsche bevolking wordt geconstateerd. De geheele toenemin der inlandsche bevolking van Java van 1878 tot 1887 kan intusschen o ongeveer $37^0/_0$ worden geschat. Nog steeds is het ondoenlijk het aantz inlanders, levende op de Buitenbezittingen, anders dan bij benaderin op te geven en dat cijfer, in een vorig verslag op zes en een half mi lioen geschat, schijnt, voor zoo verre bekend is geworden, in zijn gehee geen noemenswaardige verandering te hebben ondergaan.

Topographische Dienst.

De opnemingen werden gedurende 1888 onverpoosd voortgezet. Dot de twee, ter Sumatra's Westkust bescheiden, opnemingsbrigades werd een oppervlakte van 1333 vierkante kilometer op de schaal van 1:20,00 opgemeten, terwijl de beide andere brigades, in de Residentie Westera deeling van Borneo, de aanzienlijke oppervlakte van 14,820 vierkant kilometers op de schaal van 1:200,000 opnamen; onder welke laatst ook begrepen is de opneming van de hoofdplaats Sintang en omstreken op een schaal van 1:20,000 en van 's Gouvernements rechtstreeksch gront gebied aldaar, op de schaal van 1:5000.

Op Borneo's Westkust werd het net van astronomisch bepaalde plaa sen uitgebreid met 19 punten, waarvan de berekening is afgeloopen e de ligging door steenen pilaren verzekerd. Ook zijn aldaar de grensometingen tusschen het landschap Sambas en de landschappen Landal Tajan en Sanggou, tusschen Sanggou en Tajan en Landak, alsmede tuschen Soehait en Salimbouw, Piassa en Djongkong voltooid.

Op Sumatra bleef de triangulatie-brigade hare werkzaamheden nog be palen tot het Gouvernement Sumatra's Westkust. Bij het einde van 188 was men daar echter reeds zooverre gevorderd, dat omtrent de voor zetting buiten de grenzen van dat gewest beslist moest worden; sede is te dien aanzien bepaald, dat het driehoeksnet oostwaarts zal worde uitgebreid en wel in de richting van en over de afdeelingen Laboes Batoe en Assahan der Residentie Sumatra's Oostkust, waarbij in hoof zaak de loop der Panei- en Bila-rivieren zal worden gevolgd.

Moest bij een vorig verslag worden gewag gemaakt, dat op de grei van Korintji opgerichte merkteekens door de bevolking dier onafhank jike streek waren vernield, sedert is men er niet alleen in geslaagd, om met de Korintjiers overeen te komen over eene nauwkeuriger vaststelling der grenzen tusschen hun gebied en Indrapoera, maar is ook het primaire driehoeksnet in het zuiden kunnen worden afgesloten met het bouwen van twee pilaren in het noorden van de Residentie Benkoelen.

In de residentie Tapanoli werd de bouw van pilaren voor dat net voortgezet, terwijl met dien bouw op secundaire en tertiaire punten geleidelijk werd voortgegaan, welk werk in de Padangsche Bovenlanden, op enkele uitzonderingen na, als afgeloopen kan worden beschouwd.

Op het einde van 1888 waren in het geheel 746 pilaren gereed, als 50 op primaire, 61 op secundaire en 635 op tertiaire hoekpunten. Ook de beide pilaren op de grens van het landschap Loeboe Olang Aling 1) die het vorig jaar door kwaadwilligen waren vernield, konden in den koop van dat jaar 1888 weder worden opgebouwd.

Zoo vordert die, ongetwijfeld met vele bezwaren verbonden, arbeid steeds geregeld, en blijken de daartegen aanvankelijk gemaakte bedenkingen geenszins onoverkomelijk.

Men kwam gereed met de coordinaten-berekening van 10 primaire, 12 secundaire en 108 tertiaire driehoekspunten, zoodat op 31 December 1888 de ligging in de projectie berekend was voor 36 primaire, 38 secundaire en 377 tertiaire punten.

Aangezien, wat de hoekmetingen betreft, deze triangulatie zoo deugdelijk bleek, dat een' hoogere graad van nauwkeurigheid wordt bereikt dan strikt genomen voor de cartographische doeleinden, waarvoor die werd ondernomen, vereischt wordt, zoo is de vraag gerezen of het niet geraden zoude zijn, de indertijd aangenomen basismeting (met een meetveer) te verwisselen tegen zoodanige meting met een basistoestel, gelijk op Java was gebruikt, aangezien alsdan de uitkomsten tevens dienstbaar konden zijn voor zuiver wetenschappelijk onderzoek. De vertraging die zulks in den voortgang van het werk, waarvoor het niet noodig is, zoude veroorzaken, wijl de basis dan niet alleen hermeten moest worden, maar dientengevolge ook veel herberekeningen zouden moeten geschieden, heeft echter, voorslands althans, van het denkbeeld doen afzien. De tijdroovende herberekening der triangulatie van Java, welke arbeid onder toezicht van den koogleeraar J. A. C. Oudemans te Utrecht geschiedt, wordt geregeld voortgezet; van het vervolg op de in 1875 en 1878 verschenen gedeelten

¹⁾ Uit de Sumatra-Expeditie wel bekend.

van het werk "Die Triangulation von Java" is reeds een groot gedeelte in handschrift gereed.

In het midden van 1888 werd de bewerking der secundaire triangulatie voor geheel Java beeindigd en konde worden overgegaan tot het afleiden daaruit van de zoogenoemde geodesische lengten en breedten en van de azimuthen der hoekpunten, en is tevens het kritisch onder zoek aangevat van de sterrekundig bepaalde breedten en azimuthen ter latere vergelijking met de geodesisch gedane bepalingen.

Naarmate men gereed komt met het definitief vaststellen van de leng ten en breedten van een of meer gewesten, wordt de Indische regeering met die uitkomsten bekend gemaakt en daarbij is eene geleidelijke op volging in de richting van West naar Oost aangenomen en is zulks be reids voor de residentiën Bantam, Batavia en Krawang geschied. Bij het Topographisch Bureau te Batavia ontstaat daardoor nu de gelegenheid om de samenstelling ter hand te nemen van eene aaneensluitende kaart van Java en Madura, berustende op een gemeenschappelijk projectievlak, iets wat tot dusverre ondoenlijk was, wijl bij de residentiesgewijze opneming voor elk gewest en eigen projectievlak is moeten worden aangenomen.

Van de bij het Topograpisch Bureau te Batavia in bewerking zijnde kaarten zagen aldaar in 1888 het licht:

In photo-lithographie:

- 1º eene kaart van Batavia en Meester Cornelis met omstreken op 1: 20,000
- 2º een verbeterde herdruk van de detailkaart der Residentie Batavia op 1:20,000.
- 3° de detailkaarten van eenige in de Westerasdeeling van Borneo gelegen plaatsen met hare omstreken, als Sambas, Mandhor, Bengkaijang en Sintang op 1:20,000.

In photo-lithographie met kleurendruk:

- 1° eene kaart van een gedeelte der Residentie Batavia, zich uitstrekkende van Tangerang tot Bekassi en van de kust tot Paroeng en Depok op 1:50,000.
- 2° vijf kaarten van 's Gouvernements rechtstreeksch gebied op eenige plaatsen in de Westerafdeeling van Borneo, nl. te Sambas, Tajan, Pamangkat, Sintang, en Ngabang op 1:5000.

Voor de groote manoeuvres, door een deel van het veldleger in Midden-Java gehouden, werd een kaart op 1:20,000 vervaardigd van Grabag en omstreken in de Residentie Kadoe.

Op de Topographische inrichting te 's Gravenhage zag, in de maand April jl., de Residentiekaart van Bezoeki het licht en moeten nu nog alleen die van Bantam en de Preanger Regentschappen verschijnen. Aan het manuscript der kaart van Bantam is men in Indie bezig, terwijl die van de Preanger Regentschappen hier te lande zal worden samengesteld, waartoe reeds de noodige gegevens zijn ontvangen. Die inrichting wordt ook bij voortduring op de hoogte gehouden van de wijzigingen of verbeteringen, die de vroeger verschenen Residentiekaarten behoeven, ter benuttiging bij eene tweede of derde oplage. Voor eene nieuwe uitgave komen thans het eerst in aanmerking, de bijna uitverkochte kaarten van Samarang, Kediri, Krawang, Kadoe en Bagelen.

Alleen uit de residentie Zuider- en Oosterafdeeling van Borneo kwamen in 1888 bij het bureau te Batavia topographische gegevens in, wrameld door ambtenaren van het binnenlandsch bestuur. Die gegevens betroffen de Kahayan- en Kapoeas-rivieren, het district Boven-Kapoeas, zomede de Doesoen- of Barito-rivier van Kampong Melawahan tot de grens van Midden- en Boven-Doesoen. Eene door een inlander (Djambiër) vervaardigde kaart van een deel der Djambische bovenlanden, tusschen de rivieren Tabo en Rawas, wordt door het bestuur van Palembang onderzocht tot het verzamelen van meerdere gegevens, die wellicht dienstbaar zijn te maken aan een indertijd door den Generalen staf bereids ontworpen schetskaart van het rijk Djambi en aangrenzende streken.

Hydrographische Dienst.

In 1888 voltooide de schoener Blommendal de opneming rondom Madura, waarna werd begonnen met de opneming van het gedeelte der Oostkust van Sumatra tusschen hoek Sekapong en Straat Banka. Doorden schoener Melvill van Carnbee werd de opneming langs de Noord-tust van Java voortgezet en kwam men daarmede tot nabij Duiven-taland benoorden Straat Bali.

Het stoomschip Hydrograaf beëindigde de opneming van de Karimon-Djawa-eilanden, verrichtte daarna eenige loodingen tusschen die
eilanden en Java en maakte, na vooraf gedurende een paar maanden
se Soerabaya gerepareerd te zijn, een aanvang met de opneming van
se eiland Bawean.

De in het laatst van 1887, door daartoe aangewezen afzonderlijk per-

soneel, aangevangen opneming van de Brandewijnsbaai en de reede va Padang werd in 1888 beëindigd.

De sterrekundige plaatsbepalingen werden gedurende de maanden Jutot en met October langs de Kleine Soenda-eilanden voortgezet.

Bij het Hydrographisch Bureau te Batavia werden in 1888 uitgegeweite de navolgende kaarten:

Oostkust Celebes, blad I; Reede Pekalongan; Reeden Joana en Reabang; Straat Makasser, blad I en Noordkust Java, blad IV, omvitende het gedeelte tusschen de reede Pekalongan en het eiland Mandelik Tevens verscheen in 1888 de Gids voor het bevaren der Gaspar-Strate

Kadaster.

In de vijf residentiën, alwaar in 1887 de algemeene kadastreeris onderhanden was 1), werd deze in 1888 geregeld voortgezet, terwijl b halve in Soerabaya, alwaar dit reeds voltooid was, aldaar ook de m ting en samenstelling van het eigendoms-kadaster plaats had en was mede men in de Preanger-Regentschappen, Pasoeroean en Probolings gereed kwam. Ook werd dit werk in de Residentie Madioen in 1888,6 in Maart 1889 in Madura voltooid; het bleef nu onder handen in 6 residentiën Kediri en in Japara, Bagelen en Kadoe, in welke laats drie het eerst in 1887 was aangevangen. De noodige maatregelen t bewaring, bijhouding en benuttiging wordeu gehandhaafd.

Thans kunnen dientengevolge bereids in 15 residentiën de werkzaat heden van Gouvernements landmeter door kadastrale ambtenaren wordt uitgeoesend.

Gaandeweg wordt in steeds ruimer kring van de kadastrale kenme ken gebruik gemaakt in gerechtelijke akten betreffende onroerend gov en zulks is in het midden van 1889 weder voor een groot aantal nieuw kadastrale afdeelingen kunnen worden voorgeschreven.

Bij het einde van 1888 omvatte het geheel op Java en Madura k dastraal gemetene eene oppervlakte van 487,700 hectaren, verdeeld ov 308,284 perceelen en blokken, welke voor ongeveer ⁵/₆ waren in kaa gebracht, berekend en in de kadastrale boekhouding opgenomen.

Op globale wijze waren bovendien — na 1880 — door het kadast gemeten, in kaart gebracht en berekend 107,500 hectaren landrent

¹⁾ Zie dit Tijdschrift, 2e Serie, Dl. V, Afd. Verslagen en Mededeel. No. 7-lipag. 517.

plichtige gronden en vischvijvers en 123,738 hectaren woeste, in erfpacht aangevraagde, gronden. In 1888 kwamen daarbij nog een aantal bijzondere verrichtingen: zoo werden 800 bouws apanagevelden voor de barissans van Sumanap, verdeeld in 1890 blokken, op Madura gemeten en in kaart gebracht; in Kediri 30 erfpachtsperceelen, beslaande eene oppervlakte van 10,400 hectaren, hermeten ter vervanging van weleer afgegeven foutieve meetbrieven; in Pasoeroean 1300 hectaren woeste gronden in kaart gebracht en dessa'sgewijze verkaveld, ten behoeve van een koffiecultuurplan.

In terreinen, vroeger globaal gekadastreerd, werden individueel ingemeten en in kaart gebracht 2210 vischvijvers, eene oppervlakte beslaande van 1530 hektaren, en ook werden drie mantri's, gedurende zeven maanden, in beslag genomen voor het traceeren van wegen ten behoeve van het koffietransport.

Het onderzoek naar den rechtstoestand van onbeheerde perceelen te Batavia werd voortgezet en op het terrein beëindigd, zoodat daarvan thans staten en beschrijvingen kunnen worden opgemaakt.

Op het land Tjomas, in de afdeeling Buitenzorg, werden ongeveer soo bouws gedetailleerd opgemeten, in kaart gebracht, berekend en de uitkomsten in staten verzameld.

Als proesneming voor een stelsel van landrente-heffing werden 12 dessa's in de Preanger-Regentschappen kadastraal hermeten en volgens eene nieuwe blokverdeeling aangevuld; ook werd in dat gewest een veramelkaart gemaakt van alle in erspacht uitgegeven gronden en eene nieuwe meting en karteering verricht van de terreinen der Gouvernements Ima-onderneming, en werd daarmede aangevangen voor den bergtuin Tibodas (een onderdeel van 's lands plantentuin) en omstreken.

Eindelijk werd het land Kalinjamat in Japara, dat aan de oude repentenfamilie aldaar heeft toebehoord, voor de uitgifte in erfpacht gemeten en in kaart gebracht.

Ook vorderden de verpondingsaangelegenheden weder vele bemoeienisten, werden van het personeel tal van kleine diensten in het belang van Indere takken van bestuur gevorderd en, voor zooveel de stand van het Verk toeliet, gegevens aan het binnenlandsch bestuur verstrekt. Ten einde een overzicht te bekomen over de voornaamste werkzaamheden in de drie laatste jaren door het personeel der 34 bestaande kantoren verricht, wordt ten slotte onderstaand staatje medegedeeld.

	In 1886.	In 1887.	In 1888.
A. Meetwerk.			
Aantal gerapporteerde grondveranderingen	16,888	19,867	21,066
Aantal verzwegen grondveranderingen	51,141	55,868	72,446
Aantal ontginningen	4,442	9,317	6,694
Aantal grondveranderingen in gevolge splitsing of samenvoeging van dessa's	220	372	220
Aantal grondveranderingen in verband tot foutief bevonden kaarten.	7	1,338	1,194
Aantal dessa's alwaar de tegalvelden afzonderlijk zijn opgemeten	762	418	197
Aantal dessa's waarvan de meting geheel is herzien	3	3,690	3,920
Aantal dessa's waar de aandeelen van het dessabestuur afzonderlijk zijn opgemeten	?	87	172
B. Kantoorwerk.			
Aantal grondveranderingen op de kaarten overgebracht	75,534	87,781	93,094
Aantal grondveranderingen die berekend zijn	68,700	89,521	97,296
Aantal kaarten die vernieuwd zijn.	976	804	1,178

Het verdient opmerking dat het aantal niet gerapporteerde grondver anderingen, die opgemeten werden, in 1883 weder driemaal grooter wat dan het getal gerapporteerde.

West-Indie.

Suriname.

In 1888 onderging het grondgebied geen verandering; of zulks eenmaal het geval zal worden ten aanzien der grens met Fransch Guyana, bezuiden de samenvloeiing van de Lawa en de Tapanahoni, hangt af van de beslissing van den scheidsrechter tot wiens benoeming de beide regeeringen zijn overeengekomen.

De bevolking, waaronder niet begrepen zijn de Boschnegers en Indianen, bedroeg op het einde van 1888, 57,365 zielen en toont dus eene vermeerdering aan van 224 zielen en wel 20 mannen en 204 vrouwen. Het aantal daaronder aanwezige Europeanen bedroeg 736; het aantal onder contract verbonden Britsch-Indische immigranten was 4311 op alt. December 1888, zijnde in dat jaar bijna 1800 wegens beeindigd contract ontslagen, overleden of gedeserteerd; van de beide laatste rubrieken daaronder te zamen echter nauwelijks 100.

Het aantal concessiën voor de goudindustrie verleend, bedroeg in 1888 voor reeds vroeger uitgegeven perceelen 168, ter gezamenlijke grootte van 198,282 hectaren, en voor nieuwe perceelen 273 ter grootte van 136,827 hectaren.

In de eerste vier maanden van het loopende jaar kwamen daar nog bij 42 concessiën ter gezamenlijke grootte van 43,003 hectaren, terwijl in dat tijdperk tevens 63 concessiën hernieuwd werden, met eene gezamenlijke oppervlakte van 62,071 hectaren.

In 1888 werden 23 vergunningen verleend tot het doen van onderzoek maar de aanwezigheid van delfstoffen, betrekking hebbende op 325,037 dectaren.

De hoeveelheid gevonden goud bedroeg, volgens de gedane aangiften, in 1888, 58,862.75 gram; in het eerste kwartaal van 1889 bedroeg zulks 119,293 gram.

De uitvoer in 1888 was 1,029,777 gram, vertegenwoordigende eene

De aangegeven waarde van den gouduitvoer, van den aanvang der door tot een bedrag van f 11,347,572.14.

In de eerste vier maanden van het loopende jaar werden uitgevoerd 46,541 gram.

Wat betreft den landbouw, kan worden aangeteekend, dat de pro-

ductie van suiker en rum aanzienlijk afnam; vooral voor de suiker is dat cijfer hoogst aanzienlijk; ook werden minder cacao, bananen, koffie katoen en cocosnoten verkregen; daarentegen nam de opbrengst aan melasse, koren, rijst en aardvruchten toe.

Op het einde van 1888 waren 1722 hectaren, verdeeld in 1569 perceelen, aan 1522 personen in pacht afgestaan; 676 dier perceelen te zamen groot 97 hectaren, zijn gelegen in de hoofdplaats Parimaribo en het aantal pachters dezer perceelen bedroeg 721, de overige perceelen zijn, ter uitoefening van den kleinen landbouw, aan 801 personen uitgegeven.

De veestapel bedroeg op genoemd tijdstip 3853 runderen, 228 paarden, 80 muildieren, 209 ezels, 560 schapen, 825 geiten en 1875 varkens.

De handelsbeweging gedurende 1888 moge blijken uit de navolgende algemeene opgaaf:

Aangekomen 216 schepen, metende 72,907 tonnen, met een waarde van f 4,346,840.

Vertrokken 218 schepen, metende 72,634 tonnen, met een waarde van f 3,316,377.

De invoer bedroeg f 1,019,781 en de uitvoer f 223,132 minder dan in het jaar te voren.

De onderhandelingen om Suriname met Curação in telegraphische verbinding te brengen, zijn afgesprongen, doordien de concessie der maatschappij, die dat werk op zich genomen had, door de regeering van Brazilië is ingetrokken.

Curação en onderhoorigheden.

De bevolking op de verschillende eilanden bedroeg op het einde van 1888:

•	р	Curação	•	•	•	•	•	•	•	•	•		25,877	zielen
	,,	Bonaire			•								4,701	"
	,,	Aruba.			•				•			•	7,365	"
	,,	St. Mart	in	(Ne	ede	rl.	ged	leel	te)				4,431	"
	,,	St. Eusta	ıtiı	ıs.									1,563	"
	,,	Saba .		•									2,524	,,
							T	ota	al			•	46,461	zielen
op het	eiı	ide van	18	87	wei	rd	dit	op	geg	gev	en		45,714	"

hetgeen eene toeneming zoude aantoonen van 747 zielen, die echter minder zeker wordt, wijl het gebleken is dat in vorige jaren de bevolking van St. Eustatius foutief word opgegeven; bedroeg deze volgens de opgaaf van 1887, 2,335 zielen, thans toont het bovenstaande 772 zie-

len minder aan. De werkelijke toeneming der bevolking is dus waarschijnlijk belangrijk grooter.

Voor den landbouw was 1888 een zeer ongunstig jaar; op Curaçao, Bonaire en Aruba viel nagenoeg geen regen, welke toestand, door de aanboudende droogte in de eerste helft van het loopende jaar, nog verergerde.

Eerst in de maand Juni van dit jaar kwam daarin verandering en vielen milde regens.

De veestapel bedroeg in dit gouvernement: 4865 runderen, 989 paarden, 249 muildieren, 5681 ezels, 64,498 schapen, 95,759 geiten en 4902 varkens.

phosphorzure kalk. De werkzaamheden in de goud- en zwavelmijn werden ook in 1888 niet hervat, terwijl het resultaat der aldaar verrichte onderzoekingen niet bekend is geworden.

De handelsbeweging is eenigszins af te leiden uit het aantal vaartuigen dat de verschillende eilanden in 1888 aandeed; zulks is

1263 vaartuigen metende 858,667 Kub. Meters. voor Curacao Bonaire 570 20,579 Aruba 281 34,029 "St. Martin 308 58,842 " St. Eustatius 286 11,044 ,, " Saba 6,614 139

De invoer bedroeg voor Curação f 2,819,211.—, het bedrag van den sitvoer kan niet worden opgegeven;

bedroeg die uitvoer f 51,515.025 voor Bonaire Aruba ,, 385,552.94 St. Martin ,, 98,211.84 ,, ,, St. Eustatius ,, 22,552.95 " " Saba 11,481.00 " "

Op 1 Juli 1888 werd de 25 jaren te voren plaats gevonden emancipatie der slaven feestelijk herdacht.

De verbinding van Curação met het wereldtelegraafnet vorderde in 1888 zoodanig, dat zij den 70n Februari van het loopende jaar een feit is geworden.

Amsterdam, 31 October 1889.

Eene belangrijke brochure. 1).

Vele honderden jaren geleden was in het oude Griekenland het opium al bekend, en reeds toen verhieven zich, bij monde van Diogoras, een tijdgenoot van Hippocrates, stemmen tegen het gebruik daarvan?). Die waarschuwing, welke de gansche wereld had behooren ter harte te nemen, is, helaas! in den wind geslagen: het getal dergenen, die tegenwoordig verslaafd zijn aan het opium, is reeds zeer groot en neemt ongetwijfeld nog steeds toe.

Uit de reisverhalen van Jan Huygen van Linschoten en Houtman, alsmede uit een verslag van Ed. Scott, die van 1602 tot 1605 chef der Engelsche factorij in Bantam was, blijkt ons. dat het opium reeds vóor de komst der Hollanders in den Oost-Indischen Archipel bekend was, doch dat het gebruik daarvan zich grootendeels bepaalde tot de vreemde Oosterlingen, die in de zeehavens aanwezig waren, en de rijken en voornamen 3). Aan onze voorvaderen komt de twijfelachtige eer toe, de verspreiding van dit heulsap in de hand gewerkt te hebben, waardoor het zich langzamerhand in alle deelen van onze Oost toegang heeft weten te verschaffen.

De Vereenigde Oost-Indische Compagnie zag wel in, dat de alleenhandel in amfioen een geschikt middel was om grove winsten te behalen, in 1677 verkreeg zij dit monopolie voor de Mataramsche landen als belooning voor aan den vorst bewezen diensten, en een jaar daarna werd het haar ook door den sultan van Cheribon in zijn gebied afgestaan. Hoezeer de Compagnie zich de haar toegestane voorrechten ten nutte maakte, moge blijken uit het feit, dat de invoer voor hare rekening, die in 1640 187 pond en in 1650 648 pond bedroeg, in 1677 tot 10,025, in 1678 tot 67,444 en in 1745 tot 156,148 pond steeg. Daarbij

Opiumpacht of opiumrégie door N. J. Struick, lastst inspecteur van financiën is N.-Indië, 's-Gravenhage, 1889.

²⁾ Naar aanleiding van deze opmerking zij het ons vergund, den heer Struick de juiste naamsafleiding mee te deelen, die hem blijkbaar niet bekend is. Opium is de Latijnsche vorm van een Grieksch woord (opion) en een verkleinwoord van opos, dat sap, melkachtig vocht, inzonderheid uit planten en boomen, beteekent.

J. C. Baud, Proeve van eene geschiedenis van den handel en het verbruik van opium in Ned.-Indië, pag. 89.

Mr. W. K. Baron van Dedem, De officieele literatuur over de opium op Java. (De Indische Gids, 1881, Dl. I, pag. 403.

kwam nog eene voortdurende toename van den sluikhandel, waartegen geen maatregelen bleken bestand te zijn. In het jaar 1745 stond de Compagnie den opiumverkoop aan eene particuliere vereeniging "de Amsoen-Societeit" af, die zich verplichtte tot eene jaarlijksche afname van 1200 kisten, doch in 1794 nam zij de zaken zelf weder ter hand. Daendels was het, die in 1809 het eerst tot eene verpachting van het monopolie overging, waarbij hij zijn doel, n. m. de inkomsten voor het opiumverbruik te verdubbelen, volkomen bereikte.

Asn het pachtstelsel, ons door Daendels geschonken, heeft Indië zich tot op den huidigen dag nog niet weten te ontworstelen. Wie de geschiedenis daarvan volgen wil, waarbij uitstekende gidsen hunne diensten villen verleenen 1), zal tot de ervaring komen, dat iedere regeling, al kebben daarbij ook de beste bedoelingen voorgezeten, falen moet, omdat de Regeering niet opgewassen is tegen al de slimheden der pachters (Kielstra). Nauwelijks is een nieuwe wijze van verpachting ingevoerd, of de voordeelen der vroegere treden duidelijker dan te voren in het licht, en telkens keert men weder tot een vroeger stelsel terug om opnieuw alle schaduwzijden daarvan te ondervinden. De groote moeilijkheid is steeds hierin gelegen, dat het op den voorgrond stellen der momliteit allicht eene vermindering der pachtsom na zich sleept: het is niet mogelijk, God en den Mammon tegelijk te dienen. Men vergete ziet, dat aan Indië's schatkist door het opium aanzienlijke baten toedocien. In 1792 bedroegen deze f 250,000, in 1822 f 1,500,000, in 1870 min 101/, millioen, in 1877 ruim 13 millioen en over het afgeloopen par meer dan 20 millioen 2). Daaruit ziet men, dat het verbruik enorm toegenomen, in plaats van verminderd, dat jaarlijks meerdere slachteffers door het verderfelijke heulsap worden gevraagd.

Mag het opium een middel van belasting zijn? vragen wij met Bool. In alle koloniale schrijvers beantwoorden deze vraag bevestigend, doch een groot verschil van meening bestaat er over de wijze, waarop een dergelijke belasting moet worden geheven. Hoe is tegenwoordig de bestand op Java? Daar is de inlandsche bevolking overgeleverd aan

¹⁾ Zooals: Emil Metzger, Das Opium in Indonesiën (Revue colon. int., Tome V, 1887, 186; H. J. Bool, De opiumpacht op Java (Vragen des Tijds, November 1888); B. Kielstra, Java's grootste ramp (De Gids, 1888) en verder de geciteerde artikelen Mr. W. K. Baron van Dedem.

²⁾ Ter juiste waardeering dezer cijfers moet hieraan toegevoegd worden, dat het geen Minamheid is, dat de pachters hun pachtschat niet voldoen. In 1887 waren van de pachters op Java en Madura niet minder dan 12 achterlijk in hunne betalingen.

Chineezen, die alles in het werk stellen om hun debiet uit te breiden en voor geene handelingen, hoe onzedelijk ook, terugdeinzen om opiumschuivers te kweeken en om den inlander, die eenmaal bij hem als schuiver bekend staat, dit vergif te blijven toedienen. Om deze handelingen ongestraft te kunnen plegen en het noodige opium te kunnen binnensmokkelen, - want het door het Gouvernement verstrekte dure opium bedraagt veel minder dan het verbruik, - brengt het belang van den pachter mede, inlandsche hoofden en inlandsche politie om te koopen, hetgeen hem menigmaal maar al te goed gelukt 1). Op Java wordt de pachter ontzien ter wille van de pacht. Mogen er volgens de wettelijke bepalingen niet meer dan 854 kitten zijn, de ambtenaren rapporteeren aan onze Regeering, dat er duizenden geheime opiumverkoopplaatsen zijn; trouwens, de pachter zou, in plaats van grove winsten te behalen, aanzienlijke verliezen lijden, wanneer door hem geen groote hoeveelheden opium werden binnengesmokkeld. Ten einde toch maar een hooge opbrengst te verkrijgen werd vóór de laatste, nu niet meer geldende verpachting (1886) aan de pachters van Regeeringswege verzekerd, dat "om de onrust weg te nemen, die een onderzoek naar de verboden kitten verwekt had" (d. w. z. om gegadigden niet af te schrikken van een op de bevolking te verhalen pachtschat) de bestaande gebruiken (d. w. z. verboden kitten en andere misbruiken) onveranderd zouden blijven bestaan 2). In den regel heeft de politie steeds de vervolging van opium-overtredingen of geheel overgelaten aan den pachter of wel in zijn belang vervolgingen ingesteld. In de jaren 1880 tot en met 1886 werden in vijf residentien van Midden-Java 10,476 opiumzaken voor de politierol beslecht, waaronder slechts 47, die betrekking hadden op verkoop of bezit van opium, afkomstig van de pachters, terwijl dagelijks van hunnentwege duizenden handlangers het opiumreglement overtraden in zake het verbod, dat geen opium mag worden verkocht dan in de erkende kitten 3). Op Java stellen de besturende ambtenaren er een eer in, dat de opiumpacht in hunne afdeeling stijgt, en daarnaar meten zij den bloei van hun gewest af 4). Zoo is de toestand geboren, dat Oost- en Midden-Java heden ten dage overdekt is "met een goed georganiseerd net van sluikhandel,

¹⁾ Circulaire van den Anti-Opium-Bond.

²⁾ J. Groneman, De opiumpacht (Het Nieuws van den Dag, 16 Oct. 1889, 2º Blad).

^{3) &}quot;De Locomotief" van 20 Aug. '89. Men leze daaromtrent ook de bekende "Memorie over den toestand in Indië" door Mr. P. Brooshooft, Eerste gedeelte, Samsrang, 1888.

⁴⁾ P. Meeter in de "Java-Bode" van 21 Augustus 1889.

waarvan de draden zich bevinden in handen van de pachters, een net, dat, om de ongehoorde voordeelen, die het oplevert, trots de hoogste boeten, trots de zwaarste straffen, zal blijven bestaan, zoolang het belang der pachters medebrengt het te behouden."

De minister Keuchenius en de Gouverneur-Generaal Pijnacker Hordijk zijn van meening geweest, dat hierin verandering moest komen. Toen onlangs de opiumverkoop voor het volgende jaar opnieuw verpacht moest worden, hebben zij voorgeschreven, dat de pachttijd zich slechts over één jaar en niet meer over drie jaren zou uitstrekken. Ook zijn de grenzen der "verboden kringen", waarbinnen geen opium toegelaten wordt en het verkoopen daavan strafbaar is, belangrijk uitgebreid, vooral in die streken, waar 't het minst gebruikt wordt en het schuiven dus het best kan nagelaten worden. Maar bovendien heeft de Regeering den hoofden van gewestelijk bestuur doen bevelen, voor de bewuste verpachting den gegadigden duidelijk te zeggen, dat het debiet van opium buiten de erkende kitten, onder welken naam en welk voorwendsel ook, verboden is, dat de bestaande bepalingen omtrent den verkoop buiten de kitten met onverbiddelijke gestrengheid gehandhaafd, en de misbruiken, welke reeds zoo lang hebben voortgewoekerd, met wortel en tak zullen uitgeroeid worden.

Geen wonder, dat de circulaire, waarin de Directeur van Financiën bovenstaande bevelen heeft gegeven, veel besproken is en wordt, dat velen daarvoor niets dan lof overhebben, terwijl anderen daarin,,een uitstel, dat millioenen kost" willen zien 1). Wij mogen hier ter plaatse deze quaestie niet nader toelichten en bepalen ons alzoo tot de opmerking, dat bij de nieuwe regeling de pachter steeds behouden blijft en deze juist de grootste willekeur en knevelarij op den Javaan uitoefent.

Dan verdient eene regeling, waarbij niemand persoonlijk belang heeft, volgens vele schrijvers, verreweg de voorkeur. Eene régie alzoo! Broos-hooft, Kielstra, H. D. Levyssohn Norman, J. A. N. Schimmelpenninck van der Oije 2) en anderen zijn daarvan warme voorstanders en niet het minst de schrijver onzer brochure, wiens uitnemend pleidooi aan de régie zeker vele nieuwe vrienden bezorgen zal en waarop wij om die reden de aandacht meenden te moeten vestigen. Laat ons zien, hoe Struick zich deze voorstelt.

¹⁾ Een kruisvuur van meeningen vindt men in de verschillende bladen der tot hierte verschenen nummers van: De Indische Tolk van Het Nieuws van den Dag.

²⁾ De beide laatsten in hunne Kamerreden bij de Indische begrooting van 1889, Schimmelpenninck ook in het "Dagblad voor Zuid-Holland en 's Gravenhage" van 14 October '89.

Aanvankelijk zou hij haar op Java en Madura ingevoerd willen hebber en eerst later in die Buitenbezittingen, waar de staatkundige en geogra phische gesteldheid het gedoogt.

De ruwe opium, ingekocht in de Levant of te Calcutta, worde bereid in een gou vernementsfabriek, te Batavia op te richten. Men wake er daar zorgvuldig voor, da de samenstelling van de bereide opium steeds dezelfde is. Mocht dit niet mogelijk zijn dan zorge men ten minste van elke partij opium, die gefabriceerd is, standmonsters te nemen. Deze moeten, zooals nader zal vermeld worden, bij de rechtspraak in overtre dingszaken dienen.

De bereide opium wordt in de fabriek verpakt in blikken of geelkoperen doosjes waarvan de grootste soort inhoudt één thail en de kleinste soort zoo klein als mogelijl is. Het doel is namelijk, de opium door de fabriek geheel klaar voor den verkoop is het klein te doen afleveren, ze daar dus te doen verpakken tot in de kleinste hoeveel heden, en die verpakking te merken en te verzegelen. Op die wijze wordt aan de opium verkoopers alle gelegenheid tot knoeien benomen, en zullen zij de amfioen alechts slijt ten, zooals door de postbeambten de frankeerzegels worden gedebiteerd. Een dergelijks regeling wordt reeds door sommige pachters tot op zekere hoogte ten opzichte vas hunne onderhoorigen gevolgd. Kunnen dus voor de allerkleinste hoeveelheden, bijv van 1 en ½ mata, geen doosjes meer worden gebezigd, dan gebruike men bladtin, ge latine-capsules of iets dergelijks. De hedendaagsche industrie zal ons hierbij wel de noe dige hulpmiddelen aan de hand doen. De eigenlijke verpakking kan nog gewikkeld worden in Chineesch papier, dat toegelakt en gecacheteerd wordt.

Ter hoofdplaats van elke residentie is een opiumagent, die de amfioen ontvangt van de fabriek, en naar gelang van de behoefte aan de verkoopers verzendt. Een boekhouder of commies staat hem ter zijde. De agent heeft de contrôle over de opiumverkoopers. Tevens is hij hoofd van de opiumpolitie, doch als zoodanig ondergeschikt aan he Hoofd van Gewestelijk Bestuur.

Het aantal verkoopplaatsen van opium wordt door den Gouverneur-Generaal bepaald Het zal dadelijk veel grooter moeten zijn dan dat der nu wettig bestaande, daar all geheime kitten met de uiterste gestrengheid zullen worden geweerd. Men zal dus zeke moeten rekenen op driemaal zooveel verkoopplaatsen als thans, stel 2500, dat is gemid deld ongeveer 120 per residentie. De opiumverkoopers behooren, in verhouding tot he werk, dat zij te doen zullen hebben en de bekwaamheden, die daarvoor worden ver eischt, ruim bezoldigd te worden. De betrekking wordt voornamelijk gegeven aan min dere Europeesche ambtenaren en militairen, die zich als eerlijk en betrouwbaar hebbe doen kennen. Ze kan voor sommigen strekken ter vervanging van pensioen. De bezel diging zal, buiten elk verband met de hoeveelheid opium, die gedebiteerd wordt, be dragen f 100 .- 's maands, met twee vijfjaarlijksche verhoogingen van f 25 .- 's maands Bovendien zal elke verkooper vrije woning genieten in het gebouw, dat tot magaziji en opiumverkoopplaats dient. Geene gelegenheid tot schuiven wordt daar gegeven; geen bordeelen, pandhuizen, ronggengs- of topeng-voorstellingen worden meer in de nabijheit der opiumverkoopplaats geduld. Op gemelde beambten zullen in het algemeen de bepa lingen betreffende buitenlandsche verloven niet toepasselijk zijn; slechts de buiten Ned. Indië geborenen zullen buitenlandsch verlof wegens ziekte kunnen bekomen.

De spiamverkoopers moeten de ook thans voor de kithouders der pachters voorgeschreren boeken, eenigszins gewijzigd, met de meeste nauwkeurigheid aanhouden. Vooral het dagelijks verkoopboek is een belangrijk hulpmiddel bij het opsporen van overtredingen, en kan in zekeren zin beschouwd worden als de barometer van den sluikhandel in het ressort der opiumverkoopplaats. De verkoopers zullen aan denzelfden persoon per dag niet meer dan één thail opium, hetzij in eens, hetzij bij gedeelten, mogen verkoopen. Zij zullen steeds nauwlettend het oog moeten houden op allen, die zich bij het van opium voorzien, en zich overtuigen van de identiteit der koopers, wanneer zij vermoeden, dat deze de bepalingen op de maximum-hoeveelheid door het opgeven van wache namen, enz trachten te ontduiken. Voor hunne diensten bij het opsporen van wetredingen genieten zij de belooning, die bij het bestaande opium-reglement aan aan-bregers is toegekend, namelijk het $\frac{1}{7}$ gedeelte der waarde van aangehaalde amfioen en wat de te dier zake betaalde boeten.

In elke residentie wordt één scheikundige aangesteld als beëedigd keurder en taxatur van aangehaalde opium. Men kan daartoe de burgerlijke of militaire apothekers itzen, en hunne diensten beloonen met eene toelage van f50,— tot f100.— 's maands. Itselien zou het aanbeveling verdienen, deze scheikundigen, vóór hunne aanstelling, itselien zou het aanbeveling verdienen, deze scheikundigen, vóór hunne aanstelling, itselien van bekwaamheid in opiumkeuring te doen geven. De directeur der fabriek zorgt is voor, dat de scheikundigen steeds in het bezit zijn van standmonsters der bereide opium. Alle in een gewest aangehaalde bereide amfioen wordt, na behoorlijk verzegeld in ijn, naar de hoofdplaats opgezonden, en door den scheikundige aldaar onderzocht. Die soodig kan aan dezen, op diens verzoek, door het Hoofd van Gewestelijk Bestuur, in gegoed en vooraf beëedigd Chineesch "deskundige" worden toegevoegd, ter beoorbeing van den geur en den smaak der aangehaalde opium.

Nu aldus een zooveel stelliger en vertrouwbaarder bewijs in opiumzaken te leveren kunnen de straffen, op overtredingen gesteld, eenigszins verzwaard worden. Alle xit. vervoer, verkoop van ruwe opium, in hoe geringe hoeveelheid ook, worde gemet eene geldboete van f 2,000.— tot f 10,000.— voor elke 100 katti, waarmee overtreding gepleegd is, en f100.— voor elke katti meer; bovendien met gevange-🌬, de eerste maal voor den tijd van drie maanden tot vijf jaren en bij herbaling voor tijd van zes maanden tot acht jaren. Dezelfde straffen zijn van toepassing op den bricop, het vervoer en het bezit van bereide opium, niet van het Gouvernement afestig, en van meer dan één thail Gouvernements-opium. Slechts het bezit van mindan één thail bereide clandestiene, en van meer dan één, doch minder dan vier di Gouvernements-opium worde, indien de overtreding voor de eerste maal wordt geand, gebracht tot de bevoegdheid van den politierechter, en alzoo gestraft, voor Euro-Men met f100.— boste of 8 dagen gevangenis, voor inlanders en daarmede gelijktelden met f 100.— boete of 3 maanden ter-arbeidstelling aan de openbare werken. Em groote verbetering moet gebracht worden in het politiewezen. Er wordt hier in sidden gelaten of het wenschelijk is een afzonderlijke opiumpolitie in te stellen, wei van deze gelegenheid gebruik te maken om incens een goede rijkspolitie in i leven te roepen, waaraan zoo groote behoefte bestaat. Beide denkbeelden zijn, naar Tarmeen, in mijn stelsel voor verwezenlijking vatbaar. Waar tot dusverre slechts 19,000 werd uitgegeven voor het tegengaan van den sluikhandel zoo te land als f we, rullen voor het politiewezen te land f 2,000,000.— en voor de bestrijding van

den sluikhandel ter zee f 1,500,000.— beschikbaar zijn. Uit de fondsen voor het politie wezen worden aan de opium-agenten, voor hun ressort, spionnen gelden toegewezen.

Naarmate men er in slaagt den sluikhandel te doen verminderen, hetgeen alspoed blijken moet uit het vermeerderd debiet der opinmverkoopplaatsen, en gedeeltelijk ou uit de mindere aanhalingen, wordt de verkoopprijs langzamerhand hooger gesteld. E dit kan nu geschieden, daar de regeering niet meer te doen heeft met pachters, d hare plannen verijdelen, zoodra se die in strijd meenen met hunne belangen. Ze is g heel meester van het terrein. Ook is geen sluikhandel van het eene pachtperceel in b andere, en geen clandestiene invoer in de verboden kringen door de naburige pachte meer te vreezen. Die verboden kringen blijven bestaan.

Het spreekt vanzelf, dat het verhoogen der verkoopprijzen de sluikers weder stou moediger en vindingrijker maakt. Daar stelle men uitbreiding van de opiumpolitie land en ter zee tegenover. Zoo worde voortgegaan, tot men ten laatste de grens treikt heeft, die men vooreerst niet mag overschrijden, totdat namelijk de inkomst uit de régie getrokken tegen de uitgaven, daarvoor en tegen den sluikhandel gedaa opwegen.

De uitgaven en inkomsten worden door den voormaligen inspecte van financiën aldus getaxeerd:

UITGAVEN.		INKOMSTEN.
Inkoop van opium		Voor 27,500 katti's à f 240. f 8,600,0 55,000 - 320. 17,600,0 Totaal. f 24,200,0 De geraamde uitgaven bedroegen. 9,754,8 Blijft een saldo van . f 14,445,8 d. i. ongeveer de netto opbrangst van pacht op Java en Madura, wanneer melijk alle pachtsommen door de paters werden betaald.
	f 9,754,800	

Bool is met de régie weinig ingenomen. In de eerste plaats zou of daardoor zijns inziens de steun der pachters en rijke Chineezen ontvall in den strijd tegen den sluikhandel, — maar wij vragen: is de met werking der pachters niet bedroevend gering en bovendien, wordt leverlies van hun bondgenootschap in den strijd tegen den sluikhand van anderen niet ruimschoots vergoed, doordien wij ons beter kunn wapenen tegen hunne overtredingen der opiumreglementen? Een and bezwaar van het genoemde Kamerlid is, dat de régie een geheel levan ambtenaren zou vorderen, die in goede bezoldiging een waarbt tegen verleiding zouden moeten vinden, doch ook deze grief wordt de

Struick weerlegd, waar hij opmerkt, dat ook nu de pachters vele beambten in dienst hebben, die het Gouvernement indirect betaalt.

Totaal verbod van het opium in Indië behoort tot de onmogelijkheden. Ook tot de onbillijkheden, gelijk Jhr. Mr. Elout van Soeterwoude zeer terecht opmerkte in de vergadering, die het Indisch Genootschap den 8m October 1889 hield. Waar de Regeering eeuwenlang willens en wetens alles heeft gedaan om het volk met opium te voeden, kan zij niet op cenmaal in het andere uiterste vervallen. Met het volste recht zegt Kielstra, dat er niet aan te denken valt, het gebruik van opium te verbieden. De utopisten, die dat zouden willen, dienen vooraf de proef te nemen met een verbod van het gebruik van sterken drank in het vaderland. Bovendien is het ook op Java gebleken, dat daar, waar niet geschoven wordt, veel meer jenever en arak gedronken wordt en vermindering van opiumgebruik steeds gepaard gaat met vermeerdering van het gebruik van spiritualiën (Bool). Ook verlieze men niet uit het oog, dat een absoluut verbod aan de Regeering schatten zou kosten, want zij zou niet alleen de pachtsom en de winsten op het door haar verkochte opium moeten missen, maar ook den oorlog tegen de smokkelaars op een geheel andere, veel kostbaarder wijze moeten voeren om ten slotte wellicht toch nog tot de ervaring te komen, dat al de waakzaamheid weinig baatte. De tijden zijn er niet naar, zegt Metzger, om millioenen prijs te geven, met het vooruitzicht, dat smokkelaars daarvan het grootste voordeel zouden trekken.

Men behoort te komen tot een stelsel, dat niet de nadeelen van het bestaande bevat en, voorloopig althans, geen belangrijke nadeelen aan de schatkist toebrengt; gelijk wij zagen, beantwoordt daaraan de régie. Maar al moesten er ook duizenden opgeofferd worden, wanneer — om met Raffles te spreken — een goede staatkunde en de humaniteit beide een maatregel dringend noodig maken, dan mag men dezen niet achterwege laten om bezwaren van financieelen aard. "De grootste ongerechtigbeid in Indie, ja, in de gansche wereld," aldus noemt Elout van Soeterwonde het pachtstelsel, Kielstra ziet daarin Java's grootste ramp. Wij weten wel, dat er sommigen zijn, aan de spits waarvan de betreurde Wiselius!) zich bevond, die beweren, dat het opium lang niet dien demoraliseerenden invloed op den inlander oefent als velen meenen, dat het misbruik daarvan ongeveer gelijk staat — wat de gevolgen aan-

¹⁾ J. A. B. Wiselius, De opium in Nederlandsch- en in Britsch-Indië, oeconomisch, witsch, historisch, 's Gravenhage 1886, Eerste Hoofdstuk.

gaat — met misbruik van sterken drank. Laat ons dat voor een oogenblik aannemen, maar dan vragen wij met Kielstra: Is het dan niet erg genoeg, dat Java's bevolking als het ware stelselmatig wordt verleid of gedwongen tot steeds toenemend misbruik van sterken drank? Het antwoord daarop kan niet twijfelachtig zijn bij eene natie, die een drankwet voor zichzelve noodig achtte!

Mochten de bestrijders van het opium-misbruik in Indie, hetzij door zich tot een bond te vereenigen, hetzij door het aan de kaak stellen van het kwaad in publieke geschriften, het zoover weten te brengen, dat aan hunne wenschen gehoor wordt gegeven, dan zou het eene schitterende voldoening voor hun humaan streven zijn, indien de mindere opbrengst van het opium ruimschoots vergoed werd door de bevordering van volkswelvaart, die langs andere wegen toch ook aan de schatkist ten goede komt. De toekomst moge hun die satisfactie niet onthouden!

Amsterdam.

W. F. ANDRIESSEN.

NECROLOGIE

DOOR

J. Æ. C. A. TIMMERMAN.

Buys Ballot, Christoforus Henricus Diedericus, geb. te Kloetinge, 10 October 1817, overl. 3 Februari 1890.

Nederland heest in de laatste jaren tal van geleerden verloren, wier groote verdiensten als baanbrekers op het gebied hunner wetenschap, door de geheele beschaasde wereld werden geroemd. Na Donders en Cobet, ontviel ons onlangs de grondlegger der nieuwere meteorologie 1), wiens naam, door de naar hem genoemde "wet", voorgoed aan de geschiedenis dier wetenschap verbonden is.

Na zich in de drie eerste jaren van zijn studietijd te hebben toegelegd op de studie der oude letteren, beoefende Buys Ballot, van af het jaar 1838, de wis- en natuurkundige wetenschappen. In 1844 verwierf hij den doctorsgraad, waarop hij, in het volgende jaar, benoemd werd tot lector in de geologie en mineralogie te Utrecht. Reeds toen gevoelde hij zich

¹⁾ Siegmund Günther zegt, in zijne Geophysik, Bd II, p. 202, dat men er over in rrijal zou kunnen zijn of Galton dan wel Buys Ballot als de grondlegger der nieuwere meteorologie beschouwd moet worden, en acht zich verplicht de verdienste van den errigenoemde ook in Duitschland meer in eere te brengen, te meer daar de Engelsche geleerde de wet, van het begin af, algemeen geformuleerd heeft en hij toen eene volkomen juiste theorie der cyklonale beweging ontwikkelde. (Galton, A development of the theory of cyclones, Proc. of the royal Society of London, Vol. XII, p. 385 vlg.). Ginher erkent echter dat, al moge Buys Ballot oorspronkelijk gemeend hebben dat hij door zijne wet slechts enkele eigenaardigheden der luchtcirculatie, meer bepaald in Nederland, verklaard had, hij toch ook reeds zeer spoedig de beteekenis zijner ontdekking in haren geheelen omvang heeft ingezien, getuige zijn arbeid: Erläuterung einer graphischen Mathode zur gleichzeitigen Darstellung der Witterungserscheinungen an vielen Orten. (Ann. der Phys. und Chemie, 4ter Erg. Bd. p. 559 vlg.). Dat, om het zoo tens nit te drukken, in de volheid der tijden, eene ontdekking door meerdere perso-🗪 nagenoeg gelijktijdig kan plaats hebben, leert de geschiedenis door talrijke voorbeilden. De verdienste der ontdekking wordt daardoor op zich zelve niet verminderd, 🖴 wij Nederlanders mogen ons erover verheugen dat in elk werk over meteorologie de wet van Buys Ballot" steeds het uitgangspunt vormt.

aangetrokken tot meteorologische studien en waarnemingen, welke laatste hij, met Dr. F. W. C. Krecke, begon in te stellen op Zonnenburg dat later tot observatorium werd ingericht.

Toen, bij Kon. Besluit van 1 Febr. 1854, het Koninklijk Nederlandsch Meteorologisch Instituut werd opgericht, kwam Buys Ballot, als directeur, aan het hoofd ervan te staan, terwijl hij inmiddels (1847) benoemd was tot hoogleeraar in de wiskunde aan de Utrechtsche hoogeschool.

Het aantal zijner geschriften is zeer groot; vooreerst zij hier gewezer op de uitgave der jaarboeken van het Meteorologisch Instituut (1848–1871), waarin niet alleen de waarnemingen in Nederland zelf gedaan werden opgeteekend, maar ook de vorderingen der wetenschap in he buitenland werden vermeld. Dit gedeelte is geheel door hem bewerkt.

Het werk dat hem onder de meteorologen eene eerste plaats bezorgde verscheen in 1860, onder den titel: Regelen voor te wachten weersveran deringen in Nederland, in verband met de dagelijksche telegraphische seinen

Onder zijne talrijke werken vermelden wij verder: De invoering en verklaring van den aéroklinoscoop (1868); Suggestion on an uniform system of meteorological observations (1871); zijne redevoering bij de aanvaarding van het hoogleeraarsambt: Het karakter der rede, uitgedrukt in de wiskunde; Changements périodiques, dépendants du soleil et de la lune, de duits des observatoires Neerlandaises 1729—1845. enz.

De verdiensten van Buys Ballot, als meteoroloog, breedvoerig uiteen to zetten is eene taak die ik aan meer bevoegden moet overlaten; hier is het de plaats, te wijzen op de betrekking waarin hij gestaan heeft to ons Genootschap, dat hem, bijna van af de oprichting, onder het geta zijner leden telde, dat zich steeds in zijne onverflauwde belangstelling mocht verheugen en nog zeer onlangs een bewijs daarvan ontving door de schenking van verschillende uitgaven van het Meteorologisch Instituut. Toen het internationale poolonderzoek zou plaats hebben toonde het Genootschap hoezeer het de pogingen van Buys Ballot, om ook Ne derland daaraan te doen deelnemen, wist te waardeeren, door daaraan zooveel mogelijk zijn financiëelen en moreelen steun te verleenen 1).

¹⁾ Zie het verslag der 32ste algemeene vergadering des Genootschaps, in het tijdschrift, jaargang 1881, p. 73 vlg.

Prof. Dr. A. A. W. Hubrecht heeft onlangs, in het tijdschrift "De Gids" (Maart), eem levensschets van Buys Ballot gegeven, naar welke wij den belangstellende verwijzen.

Tijdens de correctie van het bovenstaande, kwam mij in handen Heft 8, Jahrg. XII der D. Rundsch. f. Geogr. u. Stat., bevattende eene beknopte levensbeschrijving, met portret van Buys Ballot (p. 381), door W. F. Andriessen.

Het verlies van dezen veelzijdigen, bescheiden geleerde, die ook als mensch, bij zijne medeburgers, zoo hoog stond aangeschreven, is door het geheele land met smart gevoeld; aan de wetenschap ontviel, door zijn verscheiden, een harer schitterendste vertegenwoordigers.

Pissis, Aimé, geb. 1812, overl. 19 Januari 1889.

Aan eene mededeeling van Polakowsky, in Pet. Mitt. 1889, p. 97, ondeenen wij het volgende:

Pissis was Franschman van geboorte, studeerde voor ingenieur en werd, door de regeering, naar Brazilië gezonden om daar natuurwetenschappelijke verzamelingen aan te leggen voor het museum te Parijs. Later was hij korten tijd in Bolivia, en daarop vertrok hij naar Chile, waar hij de opdracht ontving om eene kaart van het land te vervaardigen. Dit werk duurde van 1848 tot 1876 (P. M. 1867, p. 70 vlg. en 1870, p. 74 vlg.). In 1870 en 1877 bezocht hij het Atacama-gebied; in 1874—76 schreef hij te Parijs zijn werk: Jeografia fisica de Chile.

In de laatste jaren was hij chef van de geographische afdeeling van bet statistisch bureau in Chile, en schreef hij verschillende artikelen in de "Anal. de la Univers. de Chile" en de "Annales des Mines" (Parijs).

Domeyko, Ignacio, geb. 1802, overl. 23 Januari 1889.

Domeyko werd in noordelijk Litauen geboren en begon in 1817 zijne studiën, te Wilna. Na aan de opstanden van 1820 en 1830 deelgenomen te hebben, vluchtte hij naar Parijs (1832) en eenige jaren daarna werd hij leeraar in de scheikunde en mineralogie aan het "liceo" te La Sereno (1838).

Hij publiceerde in 1840 eenige artikelen over de mineralogie van Chile in de "Annales des mines" (Parijs), alsmede "Elementos de Mineralojia, Jeolojia y Jeometria subterranea" (1844) en "La Araucania i sus habitantes" (1845).

Malte-Brun, Victor Adolphe, geb. te Parijs den 25^{sten} November 1816, overl. 13 April 1889.

Aan de redevoering, bij zijne teraardebestelling, uitgesproken door Levasseur, op Vrijdag 18 April 1889, ontleenen wij het volgende: 1)

Make-Brun's naam wees hem, als het ware, zijne levenstaak aan....

¹⁾ C. R. de la Soc. de Géogr. de Paris, 1889, p. 201 vlg. — Zie ook zijne levenslechrijving in D. Rundschau f. Geogr. und Stat., 1890, p. 43 vlg.

Zijn vader, Malte-Conrad Brun, meer bekend onder den naam van Conrad Malte-Brun, was met Barbié du Bocage, Jomard, Walckenaer, Letronne en anderen, wier naam ook thans nog in wetenschappelijke kringen met eere genoemd wordt, een der oprichters van het Geographisch Genootschap (te Parijs) geweest en had de eer gehad van al dadelijk benoemd te worden tot algemeen secretaris van het eenige wetenschappelijke lichaam ter wereld, dat zich toenmaals uitsluitend aan geographische studien wijdde.

Victor, zijn zoon, was sinds 1852 adjunct-secretaris en werd in 186c algemeen secretaris, in welke betrekking hij aan het Genootschap belang rijke diensten bewees. Ook was hij redacteur van de Nouvelles annale des voyages, welk tijdschrift in 1819 door zijn vader was opgericht. Verde bezorgde hij eene nieuwe uitgave van diens hoofdwerk: Précis de la géo graphie universelle.

Zijne voornaamste werken zijn voorts: La France illustrée (1855-57, 3 dln.) Les jeunes voyageurs en France. L'Allemagne illustrée. (1884-86). Les Etats-Unis et le Mexique. (1862).

Tappenbeck, geb. 14 Jan. 1861, overl. 31 Juli 1889.

De bekende, onverschrokken Afrika-reiziger die, met luitenant Kund eerst het zuidelijke Congo-bekken bereisde (1885) en daarna het, onde Duitsch protectoraat staande, gebied van Kameroen, is zeer onverwach onder een aanval van koorts bezweken.

In ons tijdschrift is van zijne reizen meermalen melding gemaakt (1881 M., p. 225, noot en 347; 1888 M., p. 435; 1889, p. 346). Men zie ool D. Rundsch. f. G. u. St. 1889, p. 282 vlg. en P. M. 1889, p. 231.

Douls, Camille, overl. 6 Febr. 1889.

In de "Compte Rendu de la Soc. de Géogr. de Paris," 1889, p. 35 vlg. doet H. Duveyrier eenige mededeelingen aangaande het uit einde van den jeugdigen onderzoekingsreiziger.

In 1887 deed Douls zijne eerste reis in een tot dusver geheel onbe kend gedeelte der Sahara 1). Na zijn terugkeer werd hij, door de regeering met eene wetenschappelijke zending daarheen belast en stelde hij zic voor, van Marokko uitgaande, Timboktoe te bereiken en vandaar nas Saint-Louis aan de Senegal te reizen. Onder den naam van El-Hac

¹⁾ Zijn verslag komt voor in het "Bulletin" van het Genootschap, 1888, 3me trimestre

Abd'El-Mâlek aanvaardde hij, als Arabier verkleed, den gevaarlijken tocht, die hem het leven kostte, want voorbij Tuat werd hij, op de westgrens van Tidikelt, door zijne beide gidsen geworgd, terwijl hij sliep.

Warburton, Peter Egerton, geb. 15 Augustus 1813 te Chester, orerleden 5 Nov. 1889 op zijn landgoed bij Adelaide, Zuid-Australië.

Aanvankelijk diende hij als officier in Engelsch-Indie. Zijne belangnijke reizen in Australië begonnen in 1857, met een tocht in het gebied
der Spencergolf; in 1858 bezocht hij het Gairdner- en het Torrens-meer.
In de volgende jaren maakte hij tochten in het gebied der Streakybazi en naar het Eyre-meer; terwijl in 1873 en 1874 zijne beroemde
reis van Alice Springs westelijk naar, de door Gregory ontdekte, De Greynivier plaats had. Hij heeft zijne reizen beschreven in: "Major Warburton's diary" (1866) en "Journey across the Western Interior of Au-

strelia" (1875) 1).

Yule, Henry, geb. 1820 te Inveresk (Schotland), overl. 30 Dec. 1889. De geleerde kolonel Sir Henry Yule had zich een grooten naam gemaakt door zijne talrijke historisch-geographische werken; het eerste daarvan is het verhaal van een tocht naar het hof van Ava, waaraan hij in 1855 deelnam: "Narrative of the mission sent by the government of India to the court of Ava in 1855 (1858); daarop volgden: Mirabilia descripta. The wonders of the East (1863); Cathay and the ways thither, being a collection of mediaeval notices of China (1866. 2 dln.); The book of Ser Marco Polo the Venetian, concerning the Kingdoms and Marvels of the East, 2 vol. first ed. 1871, sec. ed. 1875; Notes on Hiouen-Thsang's account of the principalities of Tokharistan (1872); An essay on the geography and history of the Upper Waters of the Oxus. (Bij de 2de uitg. van Wood's Journey to the Oxus); The Mirza's route from Cabul to Kashgar by crossing Pamir (Journ. R. Geogr. Soc. London 1871); Notes on the eldest Records of the Searoute to China from western Asia. (Proc. Nov. 1882, besproken in ons tijdschrift 1883, p. 28). enz.

Neumayr, Melchior, Professor in de palaeontologie aan de universiteit te Weenen, en bekend geoloog, stierf den 29en Januari 1890, sog slechts 44 jaar oud. Hij heeft zich verdienstelijk gemaakt door de

¹⁾ Levensbeschrijving in D. Rundsch. f. G. u. St., V, p. 588. — Zie ook Pet. Mitt., 1859, 1860, 1866, 1867, 1874, 1876 en 1877; alsmede Berl. Zeitschr. 1875, Bd 10.

leiding der geologische opneming van Griekenland en door het schrijven van het populaire handboek der geologie: Erdgeschichte (Leipzig, 1887, 2 dln.), dat in ons tijdschrift besproken is (jaargang 1888, Versl. en Meded., p. 140 en 327). Zijn hoofdwerk: Die Stamme des Thierreiches heeft hij niet voltooid; het eerste deel is in 1889 verschenen. 1)

Von Tschudi, Johann Jakob., geb. 25 Juli 1818 te Glarus, overl. 8 Oct. 1889; bekend door zijne uitgestrekte reizen in Zuid-Amerika, waarbij hij vooral onderzoekingen deed op het gebied der zoologie, hoewel hij ook zijne aandacht aan andere onderwerpen wijdde. Zijne voornaamste werken zijn: Untersuchungen über die Fauna Peruana (St. Gallen, 1844-47); Peru, Reiseskizsen aus den Jahren 1838 bis 1842 (St. Gallen, 1846, 2 dln.); Antigueda des Peruanas (Weenen, 1851); Die Kechuasprache (Weenen 1853, 2 dln.); Reise durch die Andes von 82d-amerika, von Cordoba bis Cobija, im Jahre 1858. (Erg. Heft n⁰ 2 zu Pet. Mitt. 1860); Reisen durch Sudamerika (Leipzig, Brockhaus, 1866-'69, 5 dln.), enz. ²).

Faidherbe, Louis Léon César, geb. 3 Juni 1818 te Lille, overl. 29 Sept. 1889. 3).

Velen zullen zich dezen naam herinneren als dien van den bekwamen en dapperen generaal, die in 1870 het Fransche noorderleger aanvoerde tegen de Duitsche troepen onder Manteuffel en Goeben. Maar ook op wetenschappelijk gebied heeft Faidherbe veel gedaan, met name door zijne werkzaamheid aan den Senegal en in Algerie en de geschriften die hij, als resultaat van jarenlange studiën, daarover in het licht heeft gegeven, zooals: Notice ethnographique sur le Sénégal (1859); L'avenir du Sahara et du Soudan (1863); Instruction sur l'anthropologie de l'Algérie (Paris, 1874); Le Soudan français (1884) en vele andere.

Massaja, Lorenzo Guglielmo, geb. 8 Juni 1809 te Piovà in Montferrat, overl. 6 Augustus 1889 4). In 1825 trad hij toe tot de Capucijner orde en legde zich, behalve op theologische studien, ook toe op de beoefening der medicijnen en der natuurwetenschappen. In 1846, toen Antoine d'Abbadie het denkbeeld tot oprichting van een station voor

i) Deutsche Rundschau f. Geogr. und Stat., 1890, p. 286.

²⁾ Zie zijne levensbeschrijving met portret in D. Rundsch. f. G. u. St., 1890, p. 187.

³⁾ Als boven, p. 140.

⁴⁾ Als boven, door Paulitschke, X, p. 329.

de Katholieke zending in Zuidelijk Abessinië had geopperd, vertrok hij daarheen, als vertegenwoordiger zijner orde, aan welke Paus Gregorius XVI die taak had opgedragen. Sinds dien tijd is Massaja, met tusschenpoozen, steeds in Abessinië als zendeling werkzaam geweest. Hij was de eerste Europeaan die, in 1858, Bonga in Kaffa bereikte, waar hij verschillende zendingsposten stichtte. Zijn werk: I miei trentacinque anni di missione nell' alta Etiopia. Memorie storiche (Roma, Milano 1885 vlg.) is ten vorigen jare door mij vermeld geworden (zie p. 353 Versl. en Meded., jaarg. 1889).

Zimmermann, Karl, overl. 16 Augustus 1889, in den ouderdom van 77 jaar, is bekend geworden door zijne groote verdiensten als topograaf en kartograaf. Hij vervaardigde indertijd de kaarten van Centraal-Azie en Afrika bij het werk van Ritter. Omstreeks 1840 gaf hij uit het werk: Kriegsschauplatz in Innerasien oder Bemerkungen zu der Webersichtskarte von Afghanistan, dem Pendschab und dem Lande am unteren Indus; later een werk over den veldtocht der Russen tegen Chiwa. In 1865 werd hij chef der topographische afdeeling van den generalen staf in Pruisen, welke betrekking hij, als generaal-majoor, tot het eind van zijn diensttijd in 1873, bekleed heeft 1).

Daly, Dominic D., overl. 15 Juli 1889. Zij die de geschiedenis van de vestiging der North-Borneo Company en van de ontdekkingsreizen welke, ten gevolge daarvan, in de binnenlanden van Noordelijk Borneo gedaan zijn, gevolgd hebben, zullen zeker met leedwezen het overlijden van Daly vernomen hebben ²).

Nadat het bovenstaande gezet was werd de treurmare bekend van het overlijden van Dr. Gerard Frederik Westerman, den schepper van het genootschap "Natura Artis Magistra", den vriend van het onze, dat, gedurende zoovele jaren, het voorrecht had in de zalen van "Artis" zijne vergaderingen te mogen houden, dank zij de nimmer falende bereidwilligheid van den ontslapene, daar waar het gold ons Genootschap hulp en steun te verleenen.

Weinigen hebben, als hij, het voorrecht gehad, op hoogen leestijd

¹⁾ Deutsche Rundschau f. Geogr. und Stat., 1890, p. 46.

Men zie o. a. in ons tijdschrift, jaargang 1888, Versl. en Meded. p. 248; 1889
 382. — Proc. R. Geogr. Soc. 1888 January.

gekomen 1), te kunnen terugzien op een leven gewijd aan studie er arbeid, op een streven, dat in weerwil van tegenwerking en tegen spoed, met het meest glansrijke gevolg bekroond is geworden. Zijn naan zal in dankbare herinnering blijven ver buiten de grenzen zijner vader stad, welke hij zoo lief had en die zooveel aan hem te danken heeft Hoezeer hij dáár vereerd werd behoef ik niet te vermelden; allen die zich het feest herinneren, dat twee jaren geleden gevierd werd, ter het denking van het 50-jarig bestaan van "Artis", weten daarvan te getuigen. Zijn naam heeft toen weêrklonken door het gansche vaderland dat thans in droef heid verkeert over het verlies van een zijner edelste burgers.

¹⁾ Westerman was den 8sten December 1808 te Amsterdam geboren en overleed al daar den 9den Mei 1890.

DE VERMEERDERING DER KENNIS VAN DEN AARDBOL GEDURENDE HET JAAR 1889

DOOR

J. Æ. C. A. TIMMERMAN.

Secretaris van het Koninklijk Nederlandsch Aardrijkskundig Genootschap.

Bij de samenstelling van het hier volgende overzicht zijn de voorzamste geographische tijdschriften geraadpleegd, welker titels hier, met le in den tekst en de noten gebezigde verkortingen, worden opgegeven: Dr. A. Petermanns Mitteilungen, herausgegeben von Prof. Dr. A. Supan. (Verkort: PM.)

Het daarbij behoorende Litteraturbericht (Verkort: PML.)

Geographisches Jahrbuch, begrundet 1866 durch E. Behm, herausgegeben von Hermann Wagner. (Verkort: Behm.)

Zeitschrift für Wissenschaftliche Geographie, herausgegeben von J. I. Kettler. (Verkort: ZWG.)

Deutsche Rundschau für Geographie und Statistik, herausgegeben von Dr. Friedrich Umlauft. (Verkort: DRGS.)

Zeitschrift der Gesellschaft für Erdkunde zu Berlin, herausgegeben von Dr. A. von Danckelman. (ZGEB.)

Mittheilungen der K. K. Geographischen Gesellschaft in Wien, redigirt von Dr. Alfred Rodler. (MGW.)

Proceedings of the Royal Geographical Society. (Proc.)

The Scottish geographical magazine. (Sc. G. Mag.)

Revue de géographie, dirigée par M. L. Drapeyron (Rev. géogr.)

Bulletin de la Société de Géographie de Paris. (Bull.)

Compte rendu des séances de la commission centrale (de la Soc. de géographie de Paris.) (CR.)

Den langen titel van ons tijdschrift heb ik afgekort tot TAG., met

bijvoeging van M. voor de afdeeling: "Verslagen en Aardrijkskundige Mededeelingen" en van A. voor die der "Meer Uitgebreide Artikelen."

Ten opzichte van de wijze van behandeling van het onderwerp heb ik, na het ten vorigen jare daaromtrent medegedeelde 1), weinig te zeggen. Ook thans zullen weder de voornaamste reizen en publicaties besproken worden, met verwijzing naar de werken of tijdschriften waarin men daaromtrent meer kan vinden, daar dit overzicht niet dan uiterst beknopt kan zijn. De titels van alle te noemen werken zullen volledig worden opgegeven, en daarbij zal ook weder zooveel mogelijk worden vermeld of er aankondigingen van de werken bestaan en waar deze te vinden zijn. In zeer vele gevallen zal ik mij tot dergelijke aanwijzingen moeten bepalen, daar ik niet in staat ben geweest alle in 1889 verschenen werken²) te lezen en te beoordeelen. Zelfs voor Supan en zijne talrijke medewerkers aan het Litteraturbericht wordt de steeds wassende stroom der geographische litteratuur te machtig, zoodat er in de inrichting van genoemde afdeeling van Petermann's Mitteilungen, sinds het begin van 1889, nogal belangrijke wijzigingen zijn gekomen. 3) De refe raten zijn, voor zoover dit mogelijk was, korter geworden; er is eent rubriek geopend voor "kleinere mededeelingen", die, om zoo te zeggen, een afvoerkanaal voor het Litteraturbericht moet vormen, en tevent worden nu alle publicaties onder laatstgenoemd hoofd opgegeven, zoodat de zoogenaamde Litteraturnotizen vervallen zijn. Zeer vele werken en artikelen worden nu eenvoudig vermeld, zonder eenige bespreking. Op die wijze hoopt Prof. Supan het binnen een paar jaren (!) zoovet gebracht te hebben, dat het tijdsverloop tusschen de verschijning van een werk en de aankondiging, niet meer dan uiterlijk drie maanden zal bedragen. Men bedenke evenwel dat in het Litteraturbericht werken worden vermeld over allerlei vakken van wetenschap, zoodat bijna geen vakgeleerde het zal kunnen inzien, zonder het een of ander te vinden wat hem in het bijzonder belang zal inboezemen, en menigeen wellicht eenigszins verwonderd zal zijn dat ook zijn werken door de geografes tot hun domein gerekend worden.

In verband daarmede wensch ik de aandacht te vestigen op de denk

¹⁾ Zie dit tijdschrift: Verslagen en Mededeelingen 1889, p. 331 vlg.

²⁾ Hierbij valt nog de opmerking te maken dat er vele vóór 1889 verschenen werket genoemd zullen worden en daarentegen de opgave voor dat jaar zelf, gelijk men licht begrijpen zal, niet volledig is.

³⁾ Zie PM. 1889, p. 16.

beelden over aard en omvang der geographische wetenschap, welke op den achtsten Duitschen geografendag te Berlijn, in April van het vorige jear, werden uitgesproken door Prof. Supan 1), die, behalve als redacteur van Petermann's Mitteilungen en van het Litteraturbericht, ook als schrijver over onderwerpen van physisch-geographischen en van oeconomisch-geographischen aard, zoowel als van overzichten op het gebied der ontdekkingsgeschiedenis 2), bij ons te lande onder de geografen zeer bekend is, terwijl er door velen aan zijne meening terecht veel gewicht wordt gehecht. Hij wijst er op dat de zoogenaamde algemeene geographie door velen als het hoog ere, het eigenlijk wetenschappelijke gedeelte in de geographische bueratuur beschouwd wordt; daar kan men naar algemeene wetten zoeken, welke de verschijnselen beheerschen; daar is men geheel op natuurwetenschappelijk terrein, dat den geograaf echter dikwijls betwist wordt door de vertegenwoordigers der verschillende wetenschappen, op welker gebied de beoesenaar der algemeene geographie zich zoo gaarne beweegt. De speciale geographie — ook wel landkunde, chorographie of chorologie genoemd 3) - bekleedt niet meer denzelfden rang als de algemeene geographie, maar is hare nederige dienares geworden, of, om een ander beeld te gebruiken, de voorhof door welken men in den tempel der algemeene geographie komt, waar uitsluitend de werkelijke wetenschap beoesend wordt. Prof. Supan schrijst dit verschijnsel toe aan de omstandigheid dat degene die een bepaald land wil beschrijven, in hoofdzaak

¹⁾ Ueber die Aufgaben der Spezialgeographie und ihre gegenwärtige Stellung in der swarzuhischen Litteratur. Vortrag, gehalten auf dem VIII Deutschen Geographentag in Berlin am 24 April 1889. Von Alex. Supan. PM. 1889, p. 153 vlg.

²⁾ O. a.: Statistik der unteren Luftströmungen. Leipzig, Duncker & Humblot, 1881. Grundzüge der physischen Erdkunde. Leipzig, Veit & Co. 1884. Zie de aankondiging in TAG. 1884, M. p. 424.

Archiv für Wirtschaftsgeographie, I Nordamerika 1880—1885, Erg. H. 84 zu PM. 1886. Zie de aankondiging TAG. 1887, M. p. 170.

Ein Jahrhundert der Afrikaforschung. Zum hundertjährigen Gedenktag der Gründung der African Association, 9 Juni 1788. PM. 1888, p. 161 vlg. Zie TAG. 1888, M. p. 430 en 1889, M. p. 333.

Oesterreich-Ungarn, in Band II, van -Unser Wissen von der Erde." — Länder-Bunde von Europa. Zie TAG. 1889, M. p. 115.

³⁾ Met algemeene geographie wordt hier niet bedoeld de geographie van alle landen der aarde, in tegenstelling met die van de afzonderlijke landen (gelijk men spreekt an algemeene geschiedenis en van die van een bepaald land), maar de beschouwing ar aarde als natuurlichaam. De chorologie daarentegen heeft tot onderwerp de beschrijving der afzonderlijke landen.

niets anders te doen heeft dan de er over bestaande werken en kaarter te raadplegen, na ze, wat hunne waarde betreft, kritisch te hebben ver geleken. Wilde hij de kennis van zulk een land werkelijk eene schred vooruitbrengen dan zou hij zelf daarheen moeten gaan, ten einde doo persoonlijk onderzoek het ontbrekende aan te vullen. Voor zoover di laatste niet geschiedt, heeft men te doen met eene op compilatie berus tende beschrijving, die, als doel van wetenschappelijken arbeid, minde aantrekkingskracht uitoefent dan de algemeene geographie.

Er moet dus een middel gevonden worden om ook aan de chorologi een arbeidsveld aan te wijzen, waar niet alleen de leerende maar oo de scheppende bekwaamheid van den beoefenaar der wetenschap zic kan ontwikkelen, zóó tevens, dat ook de innerlijke eenheid worde ve kregen welke aan de wetenschap haar eigen karakter moet geven, da haar door geen andere betwist kan worden, ook niet door de geschie denis. Supan ziet, om dit doel te bereiken, geen anderen uitweg da terug te keeren tot het gronddenkbeeld van Ritter en de mensch weder als uitgangspunt van beschouwing te nemen. De meer spi culatieve en teleologische elementen wil hij daarbij weglaten; wat de eerst betreft, deze ontberen - bij de beschrijving der afzonderlijke landen genoegzame zekerheid. Of bijv. de vroomheid en de behoudzucht va de bewoners der Alpenlanden werkelijk moeten worden toegeschreve aan de gesteldheid hunner woonplaats, is op zich zelf moeilijk uit maken. Men beperke zich tot die verhoudingen, welke binnen de gret zen van een bepaald gebied, met zekerheid zijn na te gaan; dat zijn i hoofdzaak de natuurlijke voorwaarden van de voortbrenging, het verkee de vestiging en ten deele ook van de staatkundige ontwikkeling... Dea zullen in een gebied, waar de orographische en de klimatologische fat toren, alsmede de planten- en dierenwereld en de mineralen, ongevet dezelfde zijn, in eene bepaalde richting op de bewoners inwerken, echt niet alleen door hunne eigenaardige gesteldheid op zich zelve, maar oo hierdoor dat er met een naburig gebied, met afwijkende verhoudingen bepaalde betrekkingen zullen ontstaan, welke zeer menigvuldig en afwii selend kunnen zijn. De macht der geographische tegenstellingen tussche naburige gebieden, welke elkander wederkeerig trachten op te heffen, i eene der belangrijkste omstandigheden in het leven der volken, he onderzoek van hun invloed, de taak der chorologie.

Prof. Supan gelooft wel niet dat hij eene tooverformule gevonden zon hebben, waardoor alle zwarigheden worden opgelost, maar de toepassing zijner denkbeelden is wellicht in staat het dualisme in de geographie

geheel; mijn doel was alleen de daarin aangegeven denkbeelden in knopten vorm weer te geven, daar m. i. de omstandigheid dat zulk bekwaam vertegenwoordiger der physische geographie, terugkeer mscht tot eene richting van studien, die door vele beoefenaars der tographie als niet wetenschappelijk genoeg wordt beschouwd 1), veel te nken geeft.

De geographie is nog altijd in denzelfden toestand waarin, naar wel has beweerd is, de theologie en de philosophie verkeeren of verkeerd been: zij maakt zich van alles meester 2). De vraag is in hoeverre dit hazelve tot voordeel strekt. Supan's poging om eenheid en leidende dachte in den chaos te brengen verdient, ook met het oog daarop, toejuiching van allen die overtuigd zijn van de noodzakelijkheid om feiten eens goed onder de oogen te zien.

Eene dergelijke poging is ook in het vorige jaar ten onzent gedaan, in bijzonder met betrekking tot de regeling van het hooger onderin aardrijkskunde hier te lande. Prof. Kan heeft, in ons tijdschrift

Supan vermeldt in eene noot op p. 154 dat de spreker, die op hem volgde, o.a.
 kukkelijk de woorden -algemeene of wetenschappelijke geographie" bezigde.

⁹⁾ Op den omslag van Drapeyron's Revue de Géographie staan als motto, de volde woorden, welke gebezigd zijn geworden (door wien is mij onbekend) ter geledeid van het geographisch congres te Parijs, in Augustus 1875: La géographie bien
prise, centralisera, au profit des sciences politiques, toutes les connaissances
agines.

k vestig ook de aandacht op eene in Maart te Aberdeen gehoudene lezing van Prins potkin over datgene wat de geographie behoort te zijn. In het Sc. G. Mag. 1889, 25 wordt daarvan een uittreksel gegeven. De spreker begon met de behandeling bedenkingen van velen tegen de opvatting der geographie als eene wetenschap. Volbem omvat zij drie elementen van wetenschappelijke studie: 1° de bestudeering wetten die de ontwikkeling der aardoppervlakte beheerschen; hier ontmoeten geo-🌬 en geologie elkander op een gemeenschappelijk arbeidsveld en leveren elkander Pens; 2º de klimatologie, wel te verstaan, niet de bestudeering van de wetten der ging van de atmospheer, welke tot het gebied der meteorologie behoort, maar die klimaten van de verschillende landen in hunne betrekking tot de gedaante en de Mheid der aardoppervlakte; 3° de bestudeering van de geographische verspreiding pianten en dieren en de ontwikkeling van flora's en fauna's. Maar ook de verspreisan de menschenrassen en -stammen, alsmede die der bevolking van eenig land, haren maatschappelijken toestand, behooren daartoe. De spreker helderde zijne 🜬 cht op door voorbeelden, ontleend aan de ontdekkingen en onderzoekingen der n in hun uitgestrekt gebied, en besloot zijne voordracht met eenige opmerkingen de geographie als vak van onderwijs.

uiteengezet 1) op welke grondslagen dat onderwijs, naar zijne op jare lange ondervinding gegronde overtuiging, zou behooren te worden ing richt, indien men er eenmaal toe mocht overgaan de regeling dier zaz ter hand te nemen. De schrijver geeft echter, in het eerste gedeelte va zijn opstel, ook een overzicht van datgene wat z. i. meer bepaald thet arbeidsveld van den geograaf behoort. Bij zijne akademische wer zaamheid heeft hij de aardrijkskunde altijd opgevat als land- en volke kunde, en in zijne voordrachten steeds die natuurvormen op den vorgrond gesteld, welke op het leven der bewoners den grootsten invlouitoefenen en die tevens ter verklaring van vele verschijnselen uit volkenkunde kunnen dienen.

Ook voor hem is de aarde de woonplaats des menschen, en hoen hij een juist inzicht in den aard der physische verschijnselen voor de geograaf noodzakelijk acht, omdat deze daardoor alleen in staat is de invloed na te gaan dien de aarde op hare bewoners uitoefent, is toch van oordeel dat de geograaf die uitsluitend aan onderzoekingen in het gebied der geophysiek het karakter van wetenschappelijkheid oorspronkelijkheid toegekend wil hebben, het wezen der geograph miskent.

Alvorens tot de bespreking der afzonderlijke werelddeelen over gaan, wensch ik even stil te staan bij enkele publicaties van meer gemeenen aard, met name bij de overzichten van hetgeen in de w schillende landen, gedurende deze eeuw gedaan is ter bevordering het geographisch onderzoek. Het was een schoon en vruchtbaar der beeld van het Bestuur der Parijsche "Société de Géographie", toen ! in zijn eerste rondschrijven, betrekking hebbende op een ter gelegenbi der tentoonstelling van 1889 te houden internationaal geographisch d gres 2), de Genootschappen opwekte om, ieder voor zijn eigen las een beknopt overzicht te doen samenstellen van de reizen, onderzoek gen en publicaties, welke in deze eeuw het meest hebben bijgedrag tot den vooruitgang der geographische wetenschap. Die gezamenli overzichten zouden eene kostbare bijdrage vormen tot de geschiede dier wetenschap. Vele genootschappen hebben aan die oproeping gebi gegeven, en het is ongetwijfeld hier de plaats om aan allen, die zi met den zeer omvangrijken en tijdroovenden arbeid van de samens

¹⁾ Het hooger onderwijs in aardrijkskunde hier te lande, door Prof. Dr. C. M. Et TAG. 1889, M. p. 107 vlg.

²⁾ Zie TAG. 1888, M. p. 490.

g dier overzichten hebben willen belasten, daarvoor een woord van nk toe te brengen. Voor ons Nederlanders geldt die dank den hoog-raar Dr. C. M. Kan, wiens zaakrijk artikel, met zijne uitgebreide eratuur-opgaven, in ons tijdschrift is gepubliceerd 1), terwijl het ook, elijk met de andere overzichten, in de Fransche taal, door het Comité 1 het Congres, zal worden uitgegeven.

Het overzicht van hetgeen door Rusland werd verricht, is samengeid door baron N. Kaulbars en reeds in ons tijdschrift besproken 2).

weerwil van de verdiensten, die het werk heeft, valt, naar mijne beciden meening, het gemis van rechtstreeksche verwijzingen naar de
ezigde bronnen en van de opgave der werken over de gedane reien onderzoekingen zeer te betreuren. Het wil er bij mij maar
t in dat met de op p. 272 en 273 opgegeven werken, de bibliograt over het onderwerp zou zijn uitgeput; of beter gezegd, dit is zeer
er niet het geval 3). Voor de uitgebreide lijst van atlassen en kaarten
231 vlg.) zijn wij den schrijver ongetwijfeld dank verschuldigd.

De belangrijkste reizen der Nederlanders, in de 19de eeuw ondernomen; de voorute werken, in dat tijdperk op geographisch gebied verschenen, door Prof. Dr. C. Kan, TAG. 1889, M. p. 510 vlg.

Aperçu des travaux géographiques en Russie, par le baron Nicolas Kaulburs, Pétersbourg, Trenké et Fusnot. Zie TAG. 1889, M. p. 680.

Last ons, om deze bewering te staven, een voorbeeld nemen. Voor mij ligt het van N. A. Sewertsof: Orographitsjeski otsjerk Pamirskoi gornoi sistemy (Orokische schets van het bergstelsel van den Pamir), 1886. Dit werk is uitgegeven als der Verhandelingen (Zapiski; wij zouden zeggen: Meer Uitgebreide Artikelen) van K. Russisch Aardrijkskundig Genootschap, dat ook de Izwestija (overeenkomende onze Verslagen en Mededeelingen) publiceert. Waar zal men nu, - gesteld dat het genoemde werk niet kent, maar dat men eens wil nagaan wat er door de en of wellicht door Sewertsof, over den Pamir geschreven is, - bij Kaulbars n zoeken? De Zapiski worden door hem niet afzonderlijk genoemd; hij geeft op: Comptes-rendus de la Société Impériale Russe de Géographie (p. 273), maar 🖏 klaarblijkelijk de Izwestija, en al gaat men dus alle jaargangen daarvan na 6-1888), dan heeft men het werk zelf nog niet in handen gehad. De bij het behoorende groote kaart van den Pamir schijnt Kaulbars wel te kennen (het zelf kent hij waarschijnlijk ook wel), althans op p. 254, komt voor: 1886. Carte Pamyr, Severzow. S.G. (dit beduidt Société géographique), maar degeen die het weet, is door die zeer beknopte aanduiding nog niet veel verder. In de alphabea lijst der namen, komt die van Sewertsof (nu door den schrijver Sévertzew ge-; zie een paar regels hooger) wel voor; slaat men echter de daarbij opgegevene zijden na, dan vindt men den naam van Sewertsof (nu voorgoed Sévertzow geeven), wel telkens terug, maar nergens den titel van het hier bedoelde werk.

De secretaris van het Schotsche geographische genootschap, de he Silva White, heeft eveneens zijn arbeid gepubliceerd 1) en zich getrot aan het programma gehouden. Behalve de belangrijke reizen, wordt ook bij de verschillende werelddeelen, de werken vermeld; de laats gedeeltelijk tusschen den tekst en verder, na de behandeling van h werelddeel, vereenigd tot een bibliographisch overzicht.

Indien al de toegezegde overzichten gereed komen, zal de beteeken van het ten vorigen jare gehouden congres te Parijs, ongetwijfeld vo verreweg het grootste gedeelte dáarin gezocht moeten worden. Voor de gene die zich later een denkbeeld zal willen vormen van hetgeen onze eeuw, door de verschillende volken, is bijgedragen tot de belan rijke ontwikkeling der geographische wetenschap, is dan een grondsk aanwezig waarop het voortbouwen, vergelijkenderwijze gesproken, gema kelijk zal zijn. Moge ook de, op voorstel van den heer J. Jacksot door het Congres geuite wensch in vervulling komen: dat er in ied land alphabetische lijsten van reizigers en geografen zullen worden of gemaakt, bevattende beknopte biographieën en opgaven hunner werkt en publicaties!

Wat overigens het congres zelf aangaat, daaromtrent verwijs ik na het verslag der beide afgevaardigden van ons genootschap, in het tijk schrift 2). Ook de heer Delmar Morgan heeft een verslag er ow uitgebracht, in de Proceedings 3).

Hoe de Franschen zelven over het congres denken, ben ik tot du ver nog niet te weten gekomen. De heer Drapeyron wijdt in a Revue de géographie (Sept. '89) ééne bladzijde aan een bijzonder vlucht overzicht, met beloste, van later een vollediger verslag te zullen gevet terwijl in de Compte rendu van het Parijsch aardrijkskundig genot schap (1889, p. 356) eenvoudig gezegd wordt dat het congres goed asgeloopen; hierbij valt op te merken dat de officieele verslagen op de

¹⁾ On the achievements of Scotsmen during the ninoteenth century in the fields geographical exploration and research. A report to the Paris geographical internation congress of 1889. By Arthur Silva White, Secretary to the Royal Scottish Geophical Society. Sc. G. Mag. 1889, no. 9, 10 en 11.

²⁾ Het geographisch Congres te Parijs, van 5 tot 11 Augustus 1889. Verslagt beide afgevaardigden van het Genootschap, uitgebracht door J. Æ. C. A. Timmerm TAG. 1889, M. p. 600 vlg.

³⁾ The Geographical Congress in Paris. By E. Delman Morgan. Proc. 18
Sept. and Oct.

oogenblik (22 Nov.) nog niet waren openbaar gemaakt; zij zijn dit ook thans nog niet.

Ook over het koloniale congres, dat nagenoeg gelijktijdig met het geogzphische werd gehouden, dient hier een enkel woord gezegd te worden. Brenmin als het laatstgenoemde heeft het veel nieuws opgeleverd; het is wel eens meer beweerd dat congressen, die zoo maar in het algemeen bijeengeroepen worden, zonder een bepaald nauwkeurig omschreven programma van enkele te behandelen vraagpunten, eigenlijk weinig te beduiden hebben. En dan moet datgene wat behandeld zal worden nog hest eene onmiddellijk praktische beteekenis hebben, bijv. de internationale regeling van het spoorweg- of het postverkeer. Daar is veel waars in Gesteld al dat een der congresleden eens met een werkelijk nieuw n grootsch denkbeeld voor den dag kwam, dan zou de verkondiging ervan daar ter plaatse, geen grooter nut opleveren dan door middel van de pers. De toehoorders zijn onvoorbereid en juist bij zulk eene gelegenheid het minst geschikt om het gesprokene naar waarde te schatten. Indien des een congres ten slotte bij de deelnemers eene zekere onvoldaanheid achterlaat behoeft dat geen verwondering te baren. De bekende Henri Mager schrijst over het koloniale congres het volgende, dat ik hier onvertaald weergeef.

"Nous nous sommes réunis pendant quatre jours entiers. Qu'avons nous fait? Rien. Nous avons eu le plaisir de faire connaissance avec des délégués étrangers d'un commerce très agréable. On a causé, on a noué relation, on a admiré Tahitiennes et Javanaises, on a toasté, on l'est donné rendez-vous à Lisbonne. Mais de résolutions aucune. Pas point du programme n'a été discuté; on ne s'est même pas compté me les quelques théories qui ont été abordées au cours des séances."

Het maken van kennissen, het aanknoopen van betrekkingen heeft togetwijfeld zijn nut en daarin ligt zeker ook veel van het aantrekkelijke dat congressen blijkbaar hebben, vooral indien ook andere gunstige omtandigheden medewerken, zooals in den zomer van 1889 het geval was. Daar ik aan het koloniale congres volstrekt niet heb deelgenomen durf mij er ook verder niet over uitlaten. Indien het waar is wat Mager thrijft, dat over geen enkel punt van het programma van gedachten gewisseld, dan heeft hij werkelijk grond gehad voor zijn verzuchting. Jenwel, op een congres waar in onzen tijd koloniale vraagstukken aan de orde worden gesteld en dat daarenboven internationaal is, zijn voetgels en klemmen. De besprekingen kunnen al moeielijk anders dan een eer algemeen karakter dragen. Wat Mager's bewering aangaat dat geen

enkel punt van het programma besproken zou zijn geworden, deze schijr niet geheel juist, want de heer Guët zegt, in het weekblad "La Gét graphie" van 12 Sept. '89, dat er geen programma was.

Voor het geographisch congres was er wel een programma, mai daarin waren zooveel vraagpunten aan de orde gesteld dat het resultai ongeveer hetzelfde zou zijn geweest indien men geen programma had g had. In sommige secties deed het dienst als leiddraad, om de vergaderir gaande te houden wanneer er toevallig eens niemand was die eene med deeling had te doen of eene voordracht te houden.

Laat ik er nog bijvoegen dat het koloniaal congres slechts vijf dage geduurd heeft (30 en 31 Juli 1, 2 en 3 Aug.), onder voorzittersche van den oud minister Barbey, en dat de volgende onderwerpen in e secties werden behandeld: a. Populations et produits des colonies. Colonisation. c. Organisation des Colonies. d. Colonisation française. Colonisation étrangère. De groote meerderheid der leden waren Fransche (ca. 130); de buitenlandsche leden, ten getale van omstreeks 30, wan uit Nederland, Spanje, Portugal en België. Groot-Britannië, Denemarke Duitschland en Italië waren niet vertegenwoordigd. Uit ons land ware voor zoover mij bekend is, aanwezig de heeren H. J. Bool, Mr. H. Levyssohn Norman, J. Spanjaard, Prof. Dr. P. A. van der Lith, kol nel G. E. V. L. van Zuilen, Dr. Th. C. L. Wijnmalen en Dr. G. Riedel. Meerdere bijzonderheden omtrent het congres kan men vind in het weekblad "La Géographie" van 8 Aug. 1889.

Behalve het internationale geographisch congres te Parijs, heeft in i vorige jaar ook eene nationale bijeenkomst van geografen plaats gehanl. de 8ste Duitsche geografendag, gehouden te Berlijn op 24, 25 en April. Opmerkelijk is het hoevele der gehouden voordrachten op ond werpen uit de zoogenaamde algemeene geographie (zie boven, p. 37 betrekking hadden.

Prof. G. Neumayer sprak over het onderzoek van aard- en were magnetisme, Prof. Penck over erosie en denudatie, Prof. Partstover klimaatverandering der landen aan de Middellandsche Zee, historische tijden, Dr. Wahnschaffe over de beteekenis van den Etischen landrug voor den ijstijd, Dr. von Drygalski over beweging der continenten in den ijstijd en hun samenhang met de verandering van warmte in de aardkorst, Prof. Reyer over "Eruptiv- und Gebir typen." De voordracht van den "Oberberghauptmann," Dr. Huyssen Berlijn, had tot onderwerp: Die Tiefbohrung im Dienste der Wisse schaft, insbesondere zur Ermittelung der Warme im Innern des Er

kômers. 1) Onder de overige voordrachten waren er twee waarin over hoogtemeting en volume- en massa-bepaling van gebergten werd gesproken, nl. die van Prof. Jordan en die van Dr. Aug. Böhm; dan had men de boven vermelde van Prof. Supan en verder eene van Dr. K. von den Steinen over "Erfahrungen zur Entwickelungsgeschichte der Völkergedanken." De overige hadden betrekking op geogaphische onderwerpen van verschillenden aard (paedagogie, inrichting van tijdschriften enz). Voor het oogenblik heeft de physische richting blijkbaar de overhand; historische onderwerpen zijn niet behandeld geworden. Zelfs wanneer wij de chorologie eens buiten beschouwing laten is het toch nog in het oog vallend genoeg dat door niemand het woord sevoerd, hetzij over den tegenwoordigen stand van het geographisch anderzoek van eenig land of werelddeel, hetzij over de beteekenis der goote verkeerswegen en hunne belangrijke ontwikkeling in de laatste men, of wel over de vorderingen op kartographisch gebied, enz. Bij den eesten blik op de behandelde onderwerpen zou men evengoed kunnen aronderstellen dat er eene bijeenkomst van geologen en klimatologen eest plaats gehad; eerst bij nadere beschouwing trest men hier en daar et woord geographie aan.

Indien men mag aannemen dat de geografendagen, om het zoo eens it te drukken, de weerspiegeling zijn van de denkbeelden der toongetende kringen op wetenschappelijk geographisch gebied in Duitschland, ial er nog veel moeten veranderen alvorens de door Supan uitgesproken inkbeelden kans hebben verwezenlijkt te worden.

Een verslaggever heeft het voorrecht datgene ter vermelding te mogen itkiezen wat hem het belangrijkst voorkomt. Welnu, ik maak daarvan ebruik om in dit overzicht een gedeelte in te lasschen dat wellicht ook in lezer belangstelling zal inboezemen, hoewel het niet rechtstreeks beteking heeft op mijn onderwerp. In de jaarlijksche vergadering van it geographisch genootschap te Londen, gehouden den 27^{sten} Mei 1889, inden aan twee beroemde ontdekkingsreizigers gouden medailles uitgetikt, n.l. aan A. D. Carey en aan Dr. G. Radde. Daar eerstgetimte niet tegenwoordig was nam zijn broeder, de heer A. E. Carey medaille in ontvangst, uit handen van den voorzitter, die in zijne

i) De Verhandelingen der geografendagen worden uitgegeven bij Dietr. Reimer te bijn; die van den 8sten geografendag kosten 5 M. Het prospectus van alle geografendag is door tusschenkomst van den boekhandel te verkrijgen. Eene korte besprevan den 8sten geografendag geeft Wichmann, in PM. '89, p. 150.

toespraak wees op de groote verdiensten van den bekroonde, voor he onderzoek van Tibet.

Dr. Radde was ter vergadering aanwezig en gaf zijn dank te kenner in een toespraak, welke mij belangrijk genoeg voorkomt om hier, eenigs zins verkort, uit de Proceedings te worden overgenomen. Zij bevat een korte levensschets van den bekroonde en draagt een zekeren persoon lijken stempel die haar iets aantrekkelijks geeft.

"De zeldzame eer welke het Bestuur der R. G. Society mij heeft aar gedaan door toekenning der "Royal Medal", is de reden dat ik m thans hier bevind. Het is een schoone dag voor mij, waarop het weinig dat ik in een veertigjarig tijdperk van reizen heb kunnen verrichten med hoogste eer bekroond wordt.

"Geboren in Noordelijk Duitschland, onder behoeftige omstandighede mijner brave ouders, begon ik na hun dood den strijd om het bestaat Toen, evenals ook thans nog, bezield met liefde voor de natuur, hat eeuwige wetten en hare onuitputtelijke schoonheid, legde ik mij, onde de leiding van mijn onvergetelijken leermeester Prof. Anton Menge, to op de verwerving dier kundigheden welke voor den natuuronderzoekt onontbeerlijk zijn en daarna werd ik met onweerstaanbare kracht voor gedreven op mijn levensweg. Ik wendde het oog naar het Oosten. Ru land, meer in het bijzonder het Taurische schiereiland, ontving mij moopen armen. Het is juist nu, een genot voor mij terug te denken at die heerlijke dagen.

"In het jaar 1855 werd over mijn toekomstige loopbaan voorgoed b slist. Het Keizerlijk Russisch Aardrijkskundig Genootschap benoemd mij tot lid der expeditie naar Oost-Siberië. Na den tocht om het Baiki meer, welks omgeving mij den indruk van de diepste somberheid gi had de reis plaats naar Daurië, aan den noordelijken rand van de hoogen Gobi. In 1856 bevond ik mij in dezelfde streek waar de groe Pallas, ten tijde van keizerin Catharina, het laatste gedeelte van # arbeid voltooide. Daarop volgen twee jaren van een leven als dat vi Robinson Crusoë, in de oorspronkelijke wouden aan den Middel-Amoe welke eindigden met de stichting eener Kozakken-kolonie, die mf naam draagt. Ten slotte had in 1859 de beklimming plaats van de Munku Sardyk en het onderzoek der streek waar de oostelijke bront vieren der Jenissei ontstaan. Toen ik in 1860 met rijke verzamelinge terugkeerde, kon ik de bouwstoffen bewerken in den boezem der Ke zerlijke Akademie. De waardeering welke mijn werk ondervond van é zijde der Akademie en der universiteiten van Dorpat en Breslau, w van te meer waarde omdat zij mij de moeilijke taak van verdere onderzekingen bespaarde.

"Sedert 1864, toen ik door Z. K. H. Grootvorst Michael Nikolajewitsj, governeur van het Kaukasus-gebied, belast werd met biologisch-geographische onderzoekingen in die rijk gezegende streken, heb ik mijn arbeid tot heden voortgezet, naarmate de gelegenheid mij gunstig was en voor zoover de beperkte krachten van een enkel persoon het toelaten. It heb een geheele reeks onderzoekingstochten van meer of minder smung en beteekenis gedaan, die zich uitstrekken oven de streek van Opper-Armenië, tusschen Erzeroem in het W. en den Iranischen Sawalan in het O., en verder — met uitzondering van de Ossetische Alpen en de gebergten ten W. van den Elbroes — over den geheelen hoofdketen van den isthmus (d. i. den Kaukasus) en de hellingen en vlakten aan beide zijden. Ik heb verscheidene malen het Russische Talysj-gebied en de Gilan-vlakte bezocht.

"De expeditie welke in 1886, op bevel van den Keizer, naar Translaspie werd gezonden, stelde mij in staat meer in het bijzonder bekend te worden met de Aralo-Kaspische depressie, de Kopet-Daghketen, de Tedzjen- en de Moerghab-rivieren, het grensgebied van Afghanistan en Boordelijk Khorassan. In 1866 kon ik de grondslagen leggen voor de tichting van het Kaukasisch Museum, dat eene veilige bewaarplaats zou worden voor de verzamelingen die ik op mijne reizen gemaakt heb en datgene wat van elders werd ontvangen. Uit een klein begin en met gringe middelen heeft het zich nu ontwikkeld tot eene belangrijke loke instelling. In weerwil van vele hinderpalen en van kleingeestige frezucht, is het door geestdrift en volharding tot zijne tegenwoordige ontwikkeling gebracht.

"Wat ik tot dusver verricht heb, mijne heeren, als schrijver op het bied der aardrijkskunde of van hare zusterwetenschappen, heeft, in wervil der vele gebreken welke er aan kleven, den toets uwer kritiek doorstaan en is door u eene erkenning waardig gekeurd. De eer welke ij thans te beurt valt, mag ik aannemen als de volkomene uitdrukking er meening te mijwaarts en dat is voor mij de hoogste en kostbaarste klooning. Thans, nu mijn haar grijs wordt en mijn lichaam mij hermert aan de gebreken des ouderdoms, nu ik niet meer, zonder bezorgtid voor mij zelf, over de steppen kan dwalen, of met den vasten p van weleer kan treden over den chaos van rotsen boven den rand een gletscher of langs den steilen kraterwand van een uitgedoofden kaan, is voor mij de tijd gekomen om te gaan denken aan de rust.

"Maar ik ben door den arbeid mijns levens een rijk man geworden niet in aardsche goederen maar in gaven des geestes. Ik ben jon van hart gebleven, mijn geheugen is nog scherp, mijne verbeelding i eene levende galerij van schilderijen. In oogenblikken van opgewele geestesleven verlustig ik mij in herinneringen aan het verleden, de eet zaamheid van den verheven Kaukasus, de beklemmende stilte der Sib rische pijnboomenwouden, de woedende golven der schuimende zet mijn kampement onder de schaduw der statige boomen van het ou Colchis; zij zijn talloos, het eene tafereel volgt op het andere. En h leven te midden van die tooneelen is rijk en grootsch. Te midden van het gewoel der groote steden heb ik dikwijls het verhaal mijner tocht gedaan aan de grooten der aarde, heb ik geslapen in weelderige vi trekken, ben ik verblind geworden door den glans van goud en ko baarheden. En daarna heb ik mij ter ruste gelegd op den harden gro met een zadel als hoofdpeluw, in eene kleine joert, terwijl een Sjama zijne gebeden opzeide voor een vlammend vuur en eene arme Toeng zenvrouw den laatsten adem uitblies.

"Deze rijkdom aan herinneringen is een blijvend goed, dat mij t kan worden ontnomen. Maar op zichzelf is het van weinig waarde. O dit soort van kapitaal behoort verzekerd te worden. Er is echter m ééne macht welke daartoe in staat is en die het uit zich zelf doet zon belooning te vorderen.

"Indien eene rijke ondervinding in het leven een kostbaar goed zal b ven, behoort zij te zijn opgedaan door een dankbaar gemoed.

"In dien geest, mijne heeren, bied ik u hier thans mijn dank a Dit is niet slechts mijn plicht, maar het is mij een groot en eervol verecht....."

De lezer die met Radde's geschriften bekend is, zal uit deze zijn eigenaardigen stijl herkend hebben en zich met hem verheugen de hooge onderscheiding hem thans te beurt gevallen; eene waar bekroning van een werkzaam leven, gewijd aan de bevordering van kennis der aarde.

Wenden wij ons nu tot de afzonderlijke werelddeelen.

AFRIKA.

Indien ik, bij wijze van inleiding tot de bespreking van dit wer deel, de aandacht wensch te vestigen op reizen en werken van meenen aard, ligt het voor de hand te beginnen met den van Stanley en den terugkeer van Emin Pasja. Zoowel met het oog op de daarvoor in dit overzicht beschikbare ruimte, als omdat de lezers van dit tijdschrift, met de hoofdmomenten dier gedenkwaardige reis wel bekend zullen zijn — al ware het alleen uit de dagbladen — acht ik het onnoodig lang stil te staan bij datgene wat niet rechtstreeks van geographisch belang is. Ik zal mij, behalve daartoe, bepalen tot verwijzing naar de werken en tijdschriftartikelen, waarin men meerdere bijzonderheden omtrent den tocht kan vinden en, voor het gemak van den lezer, een beknopt chronologisch overzicht geven van de reis in haar geheel, opgehelderd door een schetskaartje.

Gelijk bekend is, verkeerde Emin Pasja, evenals Dr. Junker en kapitein Cassati, reeds sinds jaren in moeielijkheden, tengevolge van het voorddringen der aanhangers van den Mahdi van uit het Noorden en doordat de verbinding met de Oostkust zoo onzeker was, zoodat de wegen daarheen soms zeer lang achtereen volkomen waren afgesloten 1). Dr. Junker heeft in 1886 de Oostkust bereikt en is toen er in geslaagd van daaruit eene karavaan met waren naar Emin te zenden, ten einde dezen aldus in staat te stellen zich staande te houden tot hij door Stanley ontzet zou worden 2). Kapitein Cassati is aan den Boven-Nijl gebleven en thans welbehouden met Emin ter Oostkust aangekomen; de tijding van zijn dood was dus voorbarig 3).

Den 24sten December 1886 kwam Stanley te Londen om de voorbereidende maatregelen te nemen voor de expeditie, welke door de Egyptische regeering, gesteund door eenige Engelschen, met name de heeren Mackinnon en Hutton, zou worden uitgezonden. Den 21sten Januari 1887 verliet hij Engeland om in Zanzibar, waar inmiddels dragers waren aangeworven, de leiding van den tocht op zich te nemen. De expeditie werd met de grootst mogelijke zorg uitgerust en van alles voorzien, met het oog op alle gebeurlijkheden; negen Europeanen sloten zich bij den tocht aan, onder welke twee Engelsche genie-officieren, waarvan de een bepaaldelijk belast was met geographische en kartographische opnemingen alsmede astronomische plaatsbepalingen. Stanley stelde zich al dadelijk in verbinding met den beruchten Tippoe Tip, die door zijne slaven-

¹⁾ Men zie TAG. 1885, M. p. 331 vlg. en 440; 1886, M. p. 41 en 692-694; 1887, M. p. 240, 419 vlg.;

Scott. G. Mag. 1886, Nov. en Dec.; PM. 1887, p. 188-188; Nachrichten von Dr. Emin Pascha.

²⁾ Zie o. a. TAG, 1887, M. p. 240.

³⁾ TAG. 1889, M. p. 821.

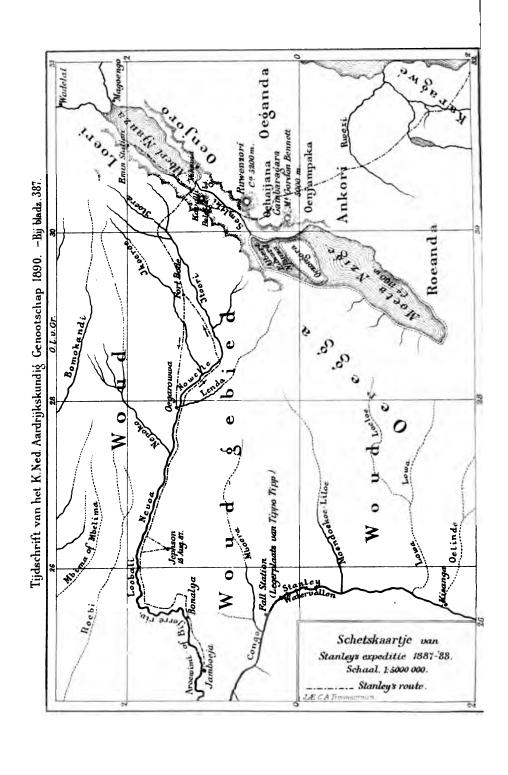
jachten in het gebied der meren en dat van den Boven- en Middel-Congo geen gunstigen naam heeft verkregen, maar die, aangespoord door het vooruitzicht op handelsvoordeelen (ivoor), aan de expeditie groote diensten kon bewijzen. Van Zanzibar vertrok Stanley per stoomschip om Zuid-Afrika naar den Congo-mond, waar hij den 18den Maart 1887 aankwam; zijne macht bestond toen uit 9 Europeanen, 61 Soedaneezen, 13 Somalis en 620 mannen uit Zanzibar 1). Na velerlei bezwaren was hij den 29sten April zoover dat hij de geheele expeditie op den Congo kon inschepen op vier stoombooten, genaamd "Stanley", "Florida", "Peace", en "Henry Reed", en verscheidene booten; den 6den Mei passeerde men Kwamouth, den 28sten bereikte men den mond der Aroewimi of Bijerre, het eigenlijke uitgangspunt der expeditie. Hier werd een officier met eene sterke afdeeling, in een daartoe ingerichte legerplaats, achtergelaten, terwijl Stanley met 5 Europeanen en 380 man, den tocht naar het Oosten zou voortzetten (2 Juni); de stoomboot "Stanley" keerde terug ten einde de te Léopoldville achtergelaten levensmiddelen en de manschappen, die onder bevel van majoor Barttelot te Bolobo waren gebleven, af te halen. Tippoe Tip was rechtstreeks naar de Stanley Falls doorgetrokken, om het door de Arabieren aldaar verwoeste Falls-Station, aan den Congo-staat terug te doen geven en tevens uit zijne manschappen aldaar, eene afdeeling te vormen waarmee hij Stanley zou volgen. Na de aankomst van Barttelot werd de legerplaats, waar een deel der expeditie onder zijn bevel zou achterblijven, ingericht bij de Jamboeja- (Yambuya-)stroomversnellingen van de Aroewimi (22 Juni). Stanley begon toen den tocht langs deze rivier, die boven de genoemde plaats goed bevaarbaar was, zoodat de stalen boot die men had medegenomen, gebruikt kon worden voor het transport der goederen 2). Nu

Eindelijk werd onlangs afzonderlijk verkrijgbaar gesteld de kaart van Afrika in 6

¹⁾ Dit overzicht is ontleend aan het Monatsbericht in PM. 1887. Men zie ook TAG. 1887, M. p. 126 en 421; 1888, M. p. 95 en 439 en PM. '89 p. 119.

²⁾ Aan de lezers die niet in het bezit mochten zijn eener tot op heden bijgewerkte, duidelijke kaart van Afrika, kan worden aanbevolen die van F. Handtke, uitgegeven door Carl Fleming te Glogau, sch. 1:14,500,000; de prijs bedraagt slechts 1 Mark (f'0,65). (Refer. van Lüddecke PML. 1890, n°. 119). Ook van de andere werelddeelen bestaan zulke kaarten, die steeds worden bijgewerkt en bij denzelfden uitgever verkrijgbaar zijn. Op iets grooter schaal is de «Karte von Afrika" von R. Andree und A. Scobel, Massst. 1:10,000,000, Leipzig, Velhagen & Klasing. Nener revidierter und vermehrter Abdruck, mit Spezialkarte der deutschen Besitzungen. Pr. 5 M.; auf Leinwand in Mappe 7,50 M.; auf Leinw. mit Stäben 8 M.

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rolgt er een tijdperk waarin men in Europa geen berichten van Stanley ontving (behalve allerlei onrustbarende geruchten uit verschillende gedeelten van Afrika afkomstig, die tot de meest uiteenloopende gissingen aanleiding gaven) en ook Barttelot vernam, in den loop van het jaar 1887 op 1888, tot het oogenblik van zijne vermoording, niets van de expeditie, welke hij zou moeten volgen zoodra Stanley hem daartoe het bericht zond. Eerst in December 1888 kwamen er brieven, waaruit bleek dat Stanley, den 29sten April 1888, Emin had aangetroffen te Kavalli (1º 22' N. B. en 30° 30' O. L.) bij het Victoria Njanza en dat hij, op zijn teragkeer naar de Aroewimi, den 17den Augustus te Banalya, in het landschap Urenia, het overschot der expeditie van Barttelot, onder bevel van luitenant Bonny, had ontmoet. Den 1sten September 1888 brak hij op nieuw van de Aroewimi op, om den overigen voor Emin bestemden voorraad naar het Albert-meer te vervoeren, dat hij den 18den Januari 1889 bereikte. Daar de toestand van Emin inmiddels steeds hachelijker was geworden en het hoogst onwaarschijnlijk was dat hij zich op den duur in zijne provincie zou kunnen staande houden, sloot hij zich bij Stanley aan, waarop den 8sten Mei de tocht van het Albert-meer naar de Oostkust begon. Door het dal der Semliki-rivier, die zich van het Z. in dat meer stort, kwam Stanley aan het in 1876 door hem ontdekte Moeta Nzigemeer, dat hij thans Albert Edward-meer noemde; dit is dus het meer waaruit de westelijke bronrivier van den Witten Nijl ontstaat 1).

Langs den hoogen Ruwenzori-berg, die door luitenant Stairs tot 3200 M. hoogte werd beklommen (de totale hoogte wordt geschat op 5800 M.), trok men in zuidoostelijke richting, door verschillende landschappen, naar het zuidwestelijke uiteinde van het Victoria Njanza, dat zich tot 2°48′ Z. Br. uitstrekt, dus veel verder dan tot dusver, naar Stanley's eerste opneming in 1875, verondersteld was geworden. Van daar werd de marsch in zuidoostelijke richting voortgezet tot den 6den December 1889, den dag van aankomst te Bagamoyo, waar Emin, — na zoovele

binden, schaal 1:10,000,000, in Stieler's Handatlas, welke kaart bewerkt is door Dr. R. Lüddecke. Daarbij is een register van 16,000 er op voorkomende namen gevoegd, met aanwijzing waar men ze op de kaart kan vinden. De prijs der kaart, op linnen, in omsiag bedraagt 10 Mark. Eene bijzondere aanbeveling dezer kaart mag overbodig besten.

¹⁾ Men vindt de beschrijving van het eerste gedeelte van den tocht, door Stanley zelf, in Scot. G. Mag. 1889 May, en Proc. May (schrijven van 1 Sept. 1888), en in Mouvement Géographique 1889 Avril, en Revue de géographie 1889 Mai, (brief van 28 Aug. 88).

jaren van moeielijken arbeid, omringd door gevaren, — het ongeluk had, door een val, zoozeer gekwetst te worden dat het twijfelachtig is of hij herstellen zal 1).

In een schrijven dd. 17 Aug. 1889 van Stanley aan de geographische genootschappen te Londen en te Edinburgh, uit de legerplaats te Kizinga, Uzinja, geeft hij de volgende voorstelling van het gebied der Moeta Nzige- en Albertmeeren ²).

"Van het punt waar de Nijl uit het Albert-meer komt trekke men eene rechte lijn, ter lengte van 230 Eng. mijlen, in nagenoeg zuidwestelijke richting (ten opzichte van het magnetische Noorden); men heeft dan de lengte gemeten eener inzinking, welker breedte 20 tot 50 Eng. mijlen bedraagt, en die zich uitstrekt van 3° N. Br. tot 1° Z. Br. in het midden van het Afrikaansche vasteland. Keert men het gezicht naar het N. dan heest men aan de linkerzijde dier inzinking, 1000 tot 3000 voet hooger, een onafgebroken doorloopende lijn van opheffing, waarvan de oostelijke helling steil naar den bodem der inzinking afloopt, terwijl de westelijke zacht afhelt naar de bekkens der Ituri en der Lomva; aan den rechterkant is eveneens eene bodemverheffing. Het noordelijkste gedeelte daarvan, go mijlen lang en 1000 tot 3000 voet hooger liggende dan de inzinking, is het Unjoro-plateau, dat zich in het Westen steil verheft en in het Oosten bijna onmerkbaar afloopt naar de Kafur. Het middelste gedeelte, eveneens 90 mijlen lang, bestaat uit de Ruwenzori-keten, 4000 tot 15000 voet hooger dan de gemiddelde hoogte der inzinking. Het overblijvende, zuidelijkste gedeelte der bodemverheffing is 2000 tot 3500 voet hooger dan laatstgenoemde en bestaat uit de plateau's van Uhaiyana, Unyampaka en Ankori 3).

¹⁾ Gelukkig is hij inderdaad geheel hersteld.

Sc. G. Mag. Dec. 1889, Apendix. Met een verslag van luitenant W. E. Stairs aan Stanley, over zijne beklimming van den Ruanzori. Eveneens in Proc. Dec. '89.

Ik heb de spelling der namen onveranderd gelaten; vandnar ook het verschil in spelling van den naam Ruwenzori (Stanley en Stairs).

Vergelijkt men deze beschrijving met de voorstelling op T. 7 in PM. '89 (zie de volgende noot), dan is er een belangrijk verschil, want de Semliki-vallei zou, volgens de beschrijving, ten Westen van de Ruwenzori keten moeten liggen. Ik heb niet kunnen nagaan aan welke berichten van Stanley, Wichmann zijne mededeelingen ontleend heeft en kan mij dus het hier sangegeven verschil en dat in de volgende noot niet verklaren. De brief van Stanley, dien ik bedoel, is van 17 Aug. '89; Wichmann's opstel komt voor in n°. V van PM., dat op 29 April '89 is afgesloten. Het komt mij voor dat Stairs' beschrijving op p. 9 in overeenstemming is met de in den tekst gegeven voorstelling. Zie ook MGW. '89, p. 528.

Het noordelijkste deel der inzinking, ter lengte van 90 mijlen, wordt ingenomen door het Albert Nyanza; het middelste, even lang, door het dal der Semliki-rivier; het zuidelijkste, 50 mijlen lang, door vlakten en door het Nieuwe Nyanza, dat wij allen overeengekomen zijn het Albert Edward Nyanza te noemen, ter eere van den eersten Britschen vorst die werkelijke belangstelling heeft betoond in de geographie van Afrika.

Men zal nu inzien dat de Semliki-vallei zich uitstrekt langs den voet der Ruwenzori-keten; dat zoowel aan het noordelijke als langs het zuidelijke uiteinde der Ruwenzori een meer ligt; dat de Semliki-rivier met kronkelenden loop van het hooger liggende naar het lagere meer stroomt 1).

Indien men van het hier beschrevene eene relief voorstelling maakte, zou men den indruk krijgen alsof de Ruwenzori-keten ontstaan ware door uitgraving der inzinking, en wanneer men langs de helling dier keten twee en zestig insnijdingen maakte voor riviertjes welke naar de inzinking moesten afstroomen, terwijl de wand dezer laatste hier en daar steil afloopend werd gemaakt naar het midden toe, dan zou men zich kevendig kunnen voorstellen dat de Ruwenzori door afgraving weer langmaam werd teruggebracht naar de plaats waar zij vandaan was gekomen. Dit zijn echter onderwerpen voor de geologen.

Maanden lang spanden alle Europeanen, welke deel uitmaken van deze expeditie, vóór het begin van den tocht vanaf het Albert-meer naar Zanzibar, zich in, om te begrijpen hoe het mogelijk geweest is dat Samuel Baker, staande op een heuvel bij Vacovia, vijf of zes mijlen van het uiteinde van het meer verwijderd, zulk eene geringe uitgestrektheid water "onbegrensd" kon noemen; maar toen wij om de Baleggabergen, eene berggroep ten Z. van Kavali, waren heengetrokken, zagen wij plotseling het begin der Semliki-vallei voor ons liggen, welk gezicht oorzaak was dat de officieren elkander afvroegen: hebt gij het Nyanza gezien?, terwijl de vrouwen van het Egyptisch gevolg verrukt uitriepen "loe-loe-loes." Toch waren wij slechts vier mijlen verwijderd van de vallei,

³⁾ Dit staat zeer duidelijk in Stanley's brief'), terwijl Wichmann zegt dat Stanley de bewering, volgens welke eene afwatering van het Moeta Nzige in het Albert-meer witkoopt, beslist ontkent, zonder echter gronden daarvoor aan te halen. Zie PM. 1889, p. 119. Stanleys Zug zu Dr. Emin-Pascha: mit Karte. T. 7, von H. Wichmann.

¹⁾ The Semliki-river runs from the upper to the lower lake in a zigzag course (p. 2 van den brief, regel 2 en 3 v. o.). Ik maak hieruit op dat de Semliki wit het hooger liggende meer stroomt. Er zou dan tegenspraak in Stanley's berichten zijn.

die er met haar rijp gras bijna wit uitzag en inderdaad veel gelijkenis had met het golvende watervlak van een ondiep meer.

Het gedeelte der Semliki-vallei dat zich hier ten Z. W. van het meer uitstrekt, heeft zeer weinig helling; op 30 mijlen van het meer bereikt het nog slechts eene hoogte van 50 voet boven den waterspiegel; het kan niet anders dan zeer kort geleden zijn ontstaan, laat ons zeggen gedurende de laatste eeuwen. Nabij het zuidoostelijke einde van de bergketen, stuitten wij plotseling op de Semliki-rivier, die daar eene van hare sterke krommingen maakt, en bij eene breedte van 80 tot 100 yards en eene gemiddelde diepte van 9 voet, hare watermassa onstuimig voortstuwt. De steeds afbrokkelende oevers van zandige leem verhieven zich omstreeks 6 voet boven den waterspiegel. Eén blik was voldoende om te doen zien dat de rivier vele vaste stoffen medevoert; wij bevonden dat een glas water bijna een theelepel vol daarvan bevatte. Het behoeft ons dus niet te verwonderen, dat het zuidelijk gedeelte van het Albert-meer mijlen ver zóó ondiep is dat men er nauwelijks met een roeiboot op zou kunnen varen.

Voorbij het met gras bedekte gedeelte der vallei, beginnen zich enkele acacias te vertoonen, welke boomen, naarmate wij in zuid-westelijke richting voorttrekken, eerst kleinere boschjes vormen, dan een aaneengesloten, niet dicht bosch, om ten slotte over te gaan in een dicht en hoog tropisch woud, welks boomen verbonden zijn door reusachtige slingerplanten, terwijl in hunne schaduw dicht onderhout groeit. Alles begint nu vochtig te worden, bladeren en takken glinsteren van den dauw, mos bedekt den stam en de takken. De grond is verzadigd van vocht; een voortdurende mist stijgt op uit het woud. Des morgens bedekt hij het dal van het eene eind tot het andere, en dan vormen zich stratus wolken, die zich langs de hellingen van den Ruwenzori verheffen tot zij de hoogste toppen van het gebergte bereikt hebben. De witte mist verandert dan langzamerhand in een donkere onweerswolk, die, onder donder en stortregen, zijn vocht ontlast.

De dalbodem rijst in het woudgebied aanmerkelijk sterker dan in het met gras bedekte gedeelte. Heuvels en kleine hoogten van ronden vorm verheffen zich hier er daar en de bodem is golvender. Heftige stroomen hebben langs die heuvels diepe ravijnen gevormd en lange smalle voret achtergelaten, zoodat er bij den top nauwelijks eene schrede afstand it tusschen twee ravijnen van honderd voet diepte.

Op omstreeks 75 mijlen afstands van het Albert Nyanza heeft het da eene hoogte van 900 voet boven dat meer en op dat punt eindigt he

wood plotseling. Het zuidwestelijke hoekpunt van den Ruwenzori ligt magenoeg ten O. daarvan, en met de verandering van het landschap gaat eene verandering van het klimaat gepaard. Wij hebben eene streek van eeuwig groen en onophoudelijken overgang van mist en damp tot regen achter ons en zien nu dor gras voor ons dat jaarlijks verbrandt. Het dal wordt nu eene effen grasvlakte tot het Albert Edward Nyanza."

Uit dit gedeelte van Stanley's beschrijving, waarvan wij hier niet meer kunnen overnemen, blijkt dat de vraag of het Moeta Nzige tot het Nijlgebied behoort, in bevestigenden zin is beantwoord; een reeds lang bestaan hebbend vraagstuk heeft daarmede zijne oplossing gevonden. Merkwaardig is het overigens dat de bronrivieren der Ituri slechts zeer weinig ten W. van het Albert Nyanza liggen, m. a. w. dat de waterscheiding tusschen het Nijl- en het Congo-gebied, — bestaande uit den westelijken rand der boven beschreven inzinking — zeer smal is.

Het land helt van hier zacht af naar den Congo en wordt doorstroomd door de Ituri, in den benedenloop Aroewimi of Bijerre geheeten, en waarvan de door Junker ontdekte Nepoko eene rechter zijrivier blijkt te zijn. De Ituri stroomt door het uitgestrekte tropische woudgebied dat Stanley gedurende een marsch van 160 dagen van W. naar O. heeft doorgetrokken. 1)

In het Ruwenzori-gebergte ziet Stanley het "Maangebergte", waarover reeds door de geografen der oudheid en der middeleeuwen geschreven werd. Hij haalt de woorden aan van Scheaddeddim²) een Arabisch geograaf der 15^{de} eeuw, die het volgende mededeelt: "Op het Maangebergte ontstaat de Egyptische Nijl, die in zijn noordelijken loop den aequator snijdt. Vele rivieren komen van dat gebergte en vereenigen zich in een groot meer. Uit dat meer komt de Nijl, de schoonste en grootste rivier der aarde."

¹⁾ Zie ook den vorigen jaargang M. p. 417.

²⁾ Zoo staat de naam gespeld; een Arabisch geograaf van dien naam is mij echter niet bekend. Zou Stanley ook bedoeld kunnen hebben Sjems ed-din, bijgenaamd Dimasjkt (Damascener), die inderdaad over het Maangebergte (Qomr) heeft geschreven? Daar ik de in 1866 door Mehren uitgegeven cosmographie van Dimasjkt niet bezit, kan ik Stanley's aanhaling niet vergelijken. Is mijn vermoeden juist dan moet er waarschijnlijk in den tekst niet staan 15de maar 14de eeuw, daar Sjems ed-din een tijdgenoot van Aboelfeda wordt genoemd. (Zie: Eenige mededeelingen over de Arabische geografen, isor Prof. M. J. da Goeje, TAG. I, 1876, p. 190; en Peschel, Geschichte der Erdlande, p. 148).

Stanley geeft op die woorden de volgende paraphrase:

"Op het Ruwenzori- of Sneeuw-gebergte ontspringt de westelijke bronrivier van den Boven-Nijl. Vele rivieren komen van dat gebergte en storten zich, na hunne vereeniging tot de Semliki-rivier, in een groot meer, dat door zijn ontdekker Albert Nyanza is genaamd. Uit dat meer, hetwelk ook de oostelijke bronrivier van den Boven-Nijl opneemt, komt de werkelijke Nijl, eene der beroemdste rivieren der aarde."

Men ziet dat de geographische resultaten van Stanley's reis zeer belangrijk zijn. Dengene die omtrent dien tocht meerdere bijzonderheden wenscht te weten verwijs ik, behalve naar de reeds opgegevene berichten en brieven, naar het artikel van Prof. C. M. Kan in de Gids¹), dat van Dr. H. Blink²), het opstel van luitenant-kolonel de Bas in ons tijdschrift³), en voor zoover men Stanley's loopbaan in het algemeen wil leeren kennen, naar de werken van Burdo⁴) en Montofiore⁵). Ook heeft Sc. Keltie eene verzameling uitgegeven van alk brieven van Stanley, welke sedert zijn vertrek in Januari 1887 in Europs zijn aangekomen.⁶)

Als bijdrage tot de kennis van den algemeenen toestand van Afrika beschouwd, heeft die tocht veel beteekenis. Het doel was Emin hult te verleenen opdat deze zich, naar men hoopte, tegen de troepen van den Mahdi zou kunnen staande houden; het resultaat is geweest da Emin veilig naar de Oostkust is gekomen, daar hij geen kans zag de de door hem sinds vele jaren bestuurde aequatoriaalprovincie in zijns macht te behouden. Dit is ongetwijfeld een ernstig teeken des tijds vooral wanneer men bedenkt hoeveel Emin, met geringe stoffelijke hulp middelen, door geestkracht en beleid, voor de ontwikkeling van di afgelegen streken heeft gedaan. De vruchten van zijn jarenlangen arbeizijn waarschijnlijk geheel verloren; voor de wetenschap is een groot det

¹⁾ De Gids, jaargang 1890.

²⁾ In »Mannen van beteekenis", Stanley en Emin.

³⁾ Een Nederlandsch reiziger aan den Congo, door F. de Bas, TAG. 1889, A. 1 309 vlg.

⁴⁾ A. Burdo, Stanley, sa vie, ses aventures et ses voyages, 319 pp. Paris Librair illustrée, 1888, Pr. fr. 3.50. — Zie ons tijdschrift 1889, M. p. 330 en het referaat (14 van Supan in PML. 1889.

⁵⁾ A. Montefiore, Henry M. Stanley, the African Explorer, London, Partrid; & Co. 1889; 160 pp. 8°. met kaarten en platen. Pr. 1 sh. 6 d.

⁶⁾ Londen, Low. 1890, 1 sh. Duitsche vertaling door H. von Wobeser, Leips Brockhaus 1890, Pr. f 1.—.

vm Centraal-Afrika tijdelijk geheel afgesloten; de pogingen der Europeesche mogendheden tot kolonisatie stuiten op ernstig verzet; de slavenhandel is, zoo al, dan toch zeker maar weinig verminderd. 1) Stanley zelf heeft, gelijk wij reeds boven zagen, bij het begin zijner reis, zich in verbinding moeten stellen met den slavenhandelaar Tippoe Tip.

Voor den staatsman, die voor zijn land heil ziet in het verkrijgen van gebied in andere werelddeelen, voor den handelaar, die nieuwe wegen voor zijn ondernemingen zoekt, voor den wetenschappelijken onderzoeker en niet het minst voor den menschenvriend is dat alles ver van bemoedigend. Of de denkbeelden van kardinaal Lavigerie, zelfs indien zij algemeene instemming vonden, in de praktijk uitvoerbaar zouden zijn, valt zeer te betwijfelen. 2) Men weet dat zijn doel is den slavenhandel met geweld te bestrijden, door de vorming van vrijwilligerkorpsen, uit Europeanen bestaande, die in het binnenland jacht zouden maken op de handelaars en hunne slavenkaravanen. Werkelijk hebben reels eenige jongelieden zich daartoe naar Afrika begeven. Inmiddels zijn over dit onderwerp in den laatsten tijd tal van brochures en tijdschriftartikelen verschenen 3), waaruit blijkt dat het publiek in Europa meer en meer zijne aandacht daaraan wijdt, terwijl ook de regeeringen met elkander erover in overleg zijn getreden. Afrika moge tegenwoordig

¹⁾ Men leze o. a. Supan's mededeelingen over den Afrikaanschen slavenhandel (PM. 1889, p. 22), ontleend aan officiëele bescheiden in November 1888 door de Engelsche regeering aan het Parlement overgelegd. De uitvoer van slaven heeft aan de Oostkust vooral plaats in het Portugeesch gebied en in het N. aan de Tedsjoera-baai, waar zelfs kinderen van Christenen uit Sjoa worden aangevoerd en naar de Arabische haven Hedeida gebracht.

²⁾ Zie het zeer lezenswaardige artikel van W. F. Andriessen, Slavernij en slavenkendel in Afrika. Tijdspiegel 1889, p. 280, alsmede: La traite Africaine, ses origines et son état actuel, par A. Spont, Rev. de Géogr. 1889, p. 81 vlg.

³⁾ Ziehier enkele titels: Card. Lavigerie, L'esclavage africain, 52 pp. 8°. Paris, Procure des Missions d'Afrique, 1888. — Humanus, Der Eklovenhandel in Afrika und seine Greuel, beleuchtet nach den Vorträgen des Kardinals Lavigerie und Berichten um Missionaren und Forschern, 56 pp. 8°. München, Schöningh 1888, M. 0.60. — E. Rösel, Der Feldzug gegen die Sklaverei in Afrika, dessen Notwendigkeit, Ausführbarkeit und Organisation, 31 pp. 8°. Trier, Paulinus 1889, M. 0.50. — V. L. Cameron, Savery in Africa, the disease and the remedy, 12 pp. 8°. London, Nation. Review Off. 1889, Pr. 1 d. — Gén. Philebert, La conquête pacifique de l'intérieur africain: Pagres, Musulmans et Chrétiens, Avec 3 cartes. Paris, Challamel, 1889, Pr. fr. 12.—. Eknopt refer. Proc. '89, p. 514. De tijdschriftartikels vindt men in de bibliographie us Dr. H. C. Rogge, in ons tijdschrift.

beter bekend zijn dan het tweeduizend jaren lang geweest is, het zal nog vele jaren lang heel wat moeite en hoofdbrekens veroorzaken aan de velen die er naar streven de meerdere bekendheid van het land, zijne hulpmiddelen en zijne bewoners te gebruiken als middel om hunne zeer verschillende doeleinden te bereiken. De taak van den zendeling en den philanthroop is niet gemakkelijker dan die van den handelaar en den kolonist. Beschaving en ontwikkeling gaan altijd langzaam, ook wanneer zij uit den boezem van een volk voortkomen, meer nog indien zij van buiten af moeten worden aangebracht.

In Afrika heeft men, behalve met tallooze andere bezwaren, ook steeds te kampen met de moeielijkheid van het verkeer, het gemis aan wegen en aan lastdieren. Ook Stanley heeft het weer ondervonden hoeveel moeite die groote karavanen van inboorlingen, welke de goederen moeten dragen, veroorzaken. Veel is er reeds voorgesteld om daarin verbetering te brengen 1), maar ook in dit opzicht zijn de vooruitzichten weinig gunstig.

In het koloniseeren zijn de Duitschers, onder alle volken die het in Afrika beproeven, wellicht nog het minst gelukkig, en in Duitschland vinden die pogingen om in verschillende gedeelten van Afrika gebied te verkrijgen, dan ook volstrekt geen algemeene instemming. Aan de oostkust is hunne heerschappij nog lang niet voorgoed gevestigd en de regeering heeft den bekenden Afrika-reiziger Dr. H. Wissmann, als rijkscommissaris daarheen moeten zenden, om met behulp eener sterke troepenmacht, de Duitsche macht staande te houden. Mpwapwa, een belangrijk knooppunt der wegen van het binnenland naar de kust, is door hem als hoofdkwartier gekozen.

De expeditie onder Dr. Peters, welke eveneens ten doel had Emin te ontzetten door een tocht van de Oostkust uit, heeft in dat opzicht geen resultaten opgeleverd en belooft ook overigens weinig belangrijk te zijn. Dikwijls zijn reeds zeer verontrustende berichten over den toestand der expeditie in Europa verspreid geworden en door velen wordt betwijfeld of Dr. Peters de vereischte geschiktheid heeft om als leider van zulk een moeielijke onderneming op te treden. 2) Den 15^{don} Juni landde

¹⁾ Zie o.a. De verkenning van het donkere werelddeel, door W. F. Andriessen. (Vragen des tijds). De schrijver bespreekt daarin de mogelijkheid om den Afrikaanschen olifant te temmen en als lastdier te gebruiken.

²⁾ PM. 1889, p. 79, 206, 230, 279 en 296.

de expeditie in de Kweiho-bocht en begon van daar den marsch door het zuidelijke Somali-land, met het doel om recht op Ladó aan te trekten. Den 8sten Sept. passeerde men het station Nkone in het landschap Soebakini, den 12den bereikte men het landschap Malakole; de tocht langs de boven Tana werd daarna voortgezet tot den voet van den Kenia. Volgens een bericht van 6 Dec. uit Zanzibar zouden er te Lamoe brieven zijn aangekomen, volgens welke Dr. Peters op marsch zou zijn van den Kenia naar het Baringomeer.

Tengevolge van de rechtstreeksche inmenging der Duitsche regeering in de Afrikaansche aangelegenheden, ook met betrekking tot het wetenschappelijk onderzoek der onder Duitsch protectoraat staande streken, heeft de "Afrikanische Gesellschaft", in het vorige jaar hare werkzaambeid gestaakt (1889), nadat zij gedurende een tijdperk van 15 jaren, zeer veel er toe bijgebracht heeft om het onderzoek van aequatoriaal Afrika te bevorderen. Als belangrijkste resultaten van hare bemoeiingen worden genoemd 1), de eerste nauwkeurige opnemingen aan de Loangokust, de tocht van Dr. Lenz op de Ogowe en diens reis dwars door de Sahara naar Timboektoe, de onderzoekingen in het zuidelijke Congobekken door Pogge, Schutt, Buchner, Wissmann, Kund, Tappenbeck, Wolf en Buttner, de reis van Rohlfs naar Koefra en diens opnemingen, met Stecker, in Abessinië, Flegels onderzoekingen aan de Benoeë, de opnemingen van Dr. Kaiser in Oost-Afrika en die van Bohm en Reichard tusschen de Loeapoela en de Loealaba.

De verschillende mogendheden hebben in den laatsten tijd ook weer nieuwe aanwinsten van gebied verkregen, onder dezen vorm dat bepaalde landstreken onder hun beschermheerschap worden gesteld of ook wel, dat op de kaarten de grenzen worden aangegeven van hetgeen de Duitschers "Interessenspharen", noemen. Dit laatste is een nog zachter term dan protectoraat.

De streek aan de Oostkust, tusschen de noordgrens van Witoe en de zuidgrens van het station Kismajoe is, op grond der met sultans en hoofden gesloten verdragen, in Oct. 1889 onder Duitsch protectoraat gesteld 2); Masjona- en Matabele land zijn, in weerwil van Portugal's

¹⁾ PM. '89, p. 205. MGW. '89, p. 389. De laatste aflevering der Mittheilungen van de vereeniging, bevat o.a. een overzicht der op de in den tekst genoemde onderzoekingsa en reizen betrekking hebbende publicaties, door W. Erman. Zie verder noot 6 op p. 400 van mijn artikel.

²⁾ PM. '89, p. 279.

aanspraken op het eerstgenoemde, in Maart 1889 onder Engelsch gezag gekomen, terwijl de regeering aan de nieuw opgerichte South-african company, — die op dezelfde leest is geschoeid als de N.-Borneo- en de Britsch Oost-Afrikaansche maatschappij, — over alle onbeheerde landstreken ten N. van Britsch Betsjoeana-land, ten N. en W. der Z.-Afrikaansche republiek en ten W. der Portugeesche bezittingen, tot aan de Zambezi, het souvereiniteitsrecht, onder controle der regeering, heeft toegekend 1).

Italië heeft in Febr. 1889 het sultanaat Obbia, aan de Oostkust van het Somali-land, onder zijn protectoraat gesteld, en zijn gebied daar later nog uitgebreid, zoodat het thans ligt tusschen ca. 2° 30′ N. B. en 8° 3′ N. B., terwijl ook den 29sten Sept. '89, met den negoes Menelik een verdrag is gesloten volgens hetwelk Abessinië het beschermheerschap van Italië in zooverre erkent, dat het zich verplicht, alleen door bemiddeling van dat rijk, onderhandelingen met andere staten aan te knoopen 2).

Ook dient hier gewezen te worden op de beteekenis der reis van kapitein Binger (zie p. 402 van dit overzicht). De Franschen hebben in de laatste jaren, met veel volharding, hunne heerschappij in het Senegal-gebied uitgebreid tot aan den boven-Niger, en vervolgens het ten Z. daarvan liggende gebied van Samory aan zich onderworpen 3); door de reis van Binger zijn de rijken van Tieba, Kong, Bondoekoe, alsmede de kleinere staten tot aan de kust, onder den invloed der Franschen gekomen, zoodat hun gezag zich thans uitstrekt van de Senegal tot aan de Ivoorkust. Ook voor den handel der Franschen met deze streken belooft Binger's tocht een groot belang te zullen hebben. Inmiddels is de majoor De Lannoy de Bissy, na voltooiing zijner groote kaart van Afrika op 1: 2,000,000, begonnen met de bijwerking der bladen

¹⁾ PM. '89. p. 104 en 279. — Met het oog op het bekende conflict tusschen Engeland en Portugal, zij hier gewezen op het opstel: The Portuguese in Nyassaland By J. Batalha-Reis, Sc. G. Mag. 1889, p. 256, alsmede op: Great Britain and Portugal in East Africa. By J. Stevenson, Sc. G. Mag. '89, p. 371.

²⁾ PM. '89, p. 102, 230 en 278. Zie ook met betrekking tot Italië's gebied aan de Roode Zee, Annuario Statistico Italiano, 1887—88 en Prof. Durazzo's kaart; alsmede: Possedimenti e Protettorati Europei in Africa 1889. Raccolta di Notizie Geografiche, Storiche, Politiche e Militari sulle Regioni Costiere Africane. Roma, Voghera Carlo, 8°. pp. VIII, 179. Het is eene publicatie van den Italiaanschen generalen staf en bevat allerlei opgaven aangaande de verschillende landen van Africa (Proc. '89, p. 513).

³⁾ Zie ook TAG. 1889, p. 349 en PM. '90, p. 28.

welke het eerst verschenen waren en die 5 à 6 jaren oud zijn. Daardoor zijn op bl. 10, 11, 23, 43, 48 en 49, welke thans opnieuw zijn bewerkt, belangrijke veranderingen aangebracht 1).

Over de nieuwe kaart van Afrika in Stieler's Handatlas en de grondsligen waarnaar zij bewerkt is, leze men het artikel van Luddecke, dat ook van gewicht is omdat de schrijver daarin de voornaamste bronsen opgeeft welke bij de vervaardiging dier kaart zijn gebezigd. 2)

Last ons thans de belangrijkste reizen in het Congo-gebied en dama de voernaamste publicaties, welke in den laatsten tijd daarover verschenen zijn, in het kort nagaan.

Daartoe kom ik nog even terug op den tocht van Van Gèle 3), om de aandacht te vestigen op de beschrijving welke hij zelf daarvan heest gegeven 4), en welke van gewicht is wegens de mededeelingen betreffende de verschillende langs de rivier wonende volkstammen, waarvan sommige (o. a. de Ba-Ati op 3° N. Br.) kanibalen zijn, die menschenjachten houden ten einde de gevangenen, als vleesch in voorraad te houden 5), evenals zij met hunne geiten doen; terwijl andere vriendschappelijk geind en tamelijk beschaafd waren. Boven de Songo- en Olifant-versnellingen was het dichtst bevolkte en vruchtbaarste land dat Van Gèle in Africa ooit gezien had; bananen, maismeel, sorghum, zoete aardappelen, yams, boonen, suikerriet, sesam, rijpe bananen in honing ingelegd, palmwijn met kolanoten, tabak, schapen, geiten, prachtige kippen werden in overvloed te koop aangeboden. De Boeraka en Madoeroe wonen tuschen 19° en 21° O. L. aan den rechteroever, de A-Kombe (Bakanyi, Mon-ba-ati, Banzi) aan den linker. De Banzi en Jakoma (22° O. L.) zijn tamelijk ver in het bewerken van ivoor, dat in deze streken veel voorkomt. Van Gèle zelf doodde, bij de daarnaar genoemde versnellingen, en prachtigen olifant. De vijandschap der inboorlingen, voorbij de stroomversnellingen van Cetema (c. 21° 20'), noodzaakte hem eindelijk op 22° O. L. terug te keeren (5 Jan. '88).

Van Gèle heeft op zijn tocht zeer nauwkeurig gelet op de zijrivieren en heeft er rechts drie gevonden nl., van beneden beginnende, de

i) Zie de bespreking ervan in PM. 1889, p. 182.

²⁾ Die neue Karte von Afrika in 10,000,000 (6 Blätter) in Stielers Handatlas. Von Dr. Rich. Lüddecke, PM. '89, p. 92.

³⁾ Zie TAG. 1889 M. 841.

⁴⁾ Explorations on the Welle-Mobangi-River. By Captain Van Gèle, Proc, '89 Juni, 1825 vig. met kaart. — Zie ook TAG. 1887, M, p. 311.

⁵⁾ Zie ook hetgeen Greshoff daaromtrent mededeelt, TAG. 1889, A. p. 335.

Ibenga, de Lobay en de Bangasso; de mond der laatste moet liggen op 21° 30' O. L. Zij is waarschijnlijk de benedenloop der Mbomoe of Kengo, die links de Mbili ontvangt. De eenige linker zijrivier is de Ngiri, waarover straks nader.

Een ander beambte van den Congo-staat, J. B. Werner, geeft in hetzelfde nummer der Proceedings een overzicht zijner tochten langs de Mongalla of Ngala, den Congo en de Aroewimi 1). Neemt men in aanmerking dat de Congo-staat tweemaal zoo groot is als Frankrijk en Duitschland samen, dan behoeft men zich niet zeer te verwonderen over de uiteenloopende meeningen aangaande de vruchtbaarheid en de beteekenis voor den handel van dat groote gebied, door verschillende personen daaromtrent geuit 2)

Het blijkt ook thans weer hoe groot het onderscheid tusschen twee niet eens zeer ver van elkander verwijderde streken kan zijn. Terwijl Van Gèle, zooals wij boven zagen, de vruchtbaarheid van een deel der langs de Mobangi (Doea) gelegen streken prijst, geeft Werner geen zeer opwekkende beschrijving van het gebied langs de Mongalla, waarlangs hij, met luitenant Baert 3), in November 1886, een tocht heeft gedaan. Het land der Ba-Ngala ten N. van den Congo op omstreeks 19° O.L. schijnt weinig vruchtbaar te zijn. Op drie uren afstands van de rivier eindigt alle bebouwing en het pad loopt door een onafgebroken wildernis van struikgewas, terwijl er slechts zeer weinig hooge boomen zijn. Langs de Mongalla is het land moerassig en met woud bedekt; de bevolking staat nog op een lagen trap van ontwikkeling. Stroomopwaarts worden de oevers der rivier hooger en zijn er nog al veel dorpen; de bevolking was echter zeer vijandig gestemd, zoodat men moest terugkeeren, na op bijna 3° N. B. en "ergens tusschen 20° en 21° O. L." te zijn gekomen. Ivoor komt in deze streken zeer veel voor. Daar de bodem op dat punt heuvelachtig is, gelooft de schrijver dat zich van de heuvels van Upoto aan den Congo (c. 21° 20' O. L.) tot voorbij de stroomversnellingen van Songo, in de Mobangi, een doorloopende heuvelreeks uitstrekt. Ook heeft hij opgemerkt dat er een paar mijlen boven den

¹⁾ The Congo, and the Ngala and Aruwimi Tributaries. By J. B. Werner. Van denzelfden schrijver verscheen ook: A visit to Stanley's rearguard. (Edinburgh-London 1889. Zie MGW. 1889, p. 391.

²⁾ Zie o.a. het opstel Een Nederlandsch reiziger aan den Congo, door F. de Bas. TAG. 1889, A. p. 309 vlg..

³⁾ Zie ook TAG. 1887 (IV) p. 203 en 313 waar wel de naam van luitenant Baert, maar niet die van Werner genoemd wordt.

mond der Mongalla (Ngala) verscheidene kanalen, ter breedte van 50 tot 100 yards zijn, waardoor water uit die rivier schijnt af te stroomen; de inboorlingen beweren dat zij voeren naar de Ngiri (zie boven). In December 1887 liep het water dier kanalen, toen de Congo plotseling sterk gevallen was, in en niet uit de Mongalla, waaruit Werner de gewolgtrekking maakte dat — in de onderstelling dat die kanalen in verbieding staan met de Ngiri — het water der Mobangi niet zoo sterk viel als dat van den Congo, en dat deze dus eenig water van de Ngiri breeg dat anders gewoonlijk naar de Mobangi stroomt. Men zou hier dus eene zeer eigenaardige rivierverbinding hebben. De schrijver bezocht ook den beneden-Aroewimi, het kamp te Yambuya onder Barttelot en de streek aan den mond der Lomami, waar een belangrijke marktplaats is, zoodat eene open ruimte grooter dan Trafalgarsquare vol was met inboorlingen en er op de rivier meer dan 300 groote kano's lagen.

Zoo komen wij als van zelf op de reizen van A. Delcommune 1), vertegenwoordiger der "Société du Congo pour le commerce et l'industrie", want deze is de zooeven genoemde Lomami in Dec. 1888, opgevaren, en is een paar graden verder gekomen dan Grenfell, welke die rivier in 1884 voor het eerst heeft bevaren en die haar Boloko of Loehilasj noemde; terwijl Cameron in 1874 van Njangwe naar Kilembe reizende, langs den rechteroever eener rivier was getrokken, welke evencens Lomami heette, en Wissmann deze op zijn grooten tocht in 1882 en ook later was overgetrokken op 6° N. B. Hoogstwaarschijnlijk is de door Delcommune bevaren Lomami de benedenloop der laatstbedoelde, door Cameron en Wissmann bekend geworden, Lomami. Er is echter nog eene andere rivier van dezen naam die tot het stroomstelsel van den Kassai behoort; zij valt van het O. in de Sankoeroe of Loebilasj (relken naam, zooals wij boven zagen, door Grenfell ook aan de in den Congo vallende Lomami wordt gegeven). Volkomene zekerheid is er nu echter nog niet, vooral niet aangaande het ontstaan der tot den Kassai behoorende Lomami. De laatstbedoelde, door Wolf in 1886 het eerst bevaren rivier, is mede door Delcommune bezocht geworden roor de bovengenoemde reis -, evenals het Leopold II-meer (April en Mei 1888) en de Lokenje of Ikatta, welke in dat meer of wellicht rechtstreeks in de Mfini uitstroomt 2).

¹⁾ PM. '89, p. 31, 102 en 125. Mouv. Géogr. 1889, N. 3-6.

²⁾ Men zie over de reizen in het gebied dezer rivieren, o. a. het opstel van Prof. C. M. Kan, De zijtakken van den Conqo. Met schetskaart, TAG, 1887, IV, M. p. 281.

Verder heeft de Belgische kapitein Thys, in dienst van den Congostaat, eene opneming gedaan van de Kassai en de beneden Loeloea en deze in kaart gebracht (sch. 1:200,000. Brussel, Inst. Nat. de géogr.) met opgave van de hoogten der verschillende punten 1). Eene kaart van den ontworpen spoorweg langs den Congo, van Matadi naar Stanley Pool, is door A. J. Wauters gepubliceerd in de Mouv. Géogr. 1888, n° 26 2), terwijl kapitein Cambier daarbij eene beschrijving geest van het trace en de gedane opnemingen. Voegen wij nu nog hierbij de kaart det Inkissi (sch. 1:260,000) vervaardigd door luitenant A. H. Bystrom, naar de opnemingen van luitenant C. R. Hakansson, in Nov. 1886 3), den tocht van den zendeling W. H. Bentley in Sept. 1888, van het zendingsstation Wathen bij Manjanga aan den Congo naar San Salvadon ten Z. dier rivier 4), de kaart van den middel-Congo, door Paul Langhans, naar de opnemingen van Dr. O. Baumann, op de schaal van 1: 400,000 5) en de publicatie der opneming van de Kuango door Dr. Mense 6) dan is daarmede het Congo-gebied afgehandeld, behow dens eenige werken welke in den laatsten tijd daarover verschenen zijn o. a. van Hann over het klimaat van San Salvador⁷), Bateman over den Kassai 3), Wolff over eene reis door hem, eenige jaren geleden,

¹⁾ PM. '89, p. 31.

Ibid. Zie de opgave van verschillende publicaties over den Congo-spoorweg en van tijdschriftartikelen PML. 1889, n°. 1130—1179.

³⁾ Ib. p. 231. 4) Ib. p. 54.

⁵⁾ MGW. 1889, T. XX. Zie de bespreking dier kaart PM. 1889, p. 54. Het getee kende gedeelte der rivier ligt tusschen 1° 10' Z. Br. en 1° 43' N. Br., nl. tusschen Boengt en Lozengo. De plaatsbepalingen van Rouvier zijn in eene tabel er bij opgegeven; ver der is er eene voorstelling van het verval tusschen Stanley-Falls en Stanley-Pool en zijt er verschillende kartons bij de kaart. De andere bladen zullen later zeker wel volgen

⁶⁾ PM. '89, p. 205. Hier wordt tevens over het dagboek van Dr. Rich. Büttner ge sproken (p. 206) en over de uitvoerige uittreksels welke daarvan gepubliceerd zijn. Dez komen voor in het "Schlussheft der Mittheilungen der deutsch-afrikanischen Gesellschaft" welke vereeniging onlangs ontbonden is (zie boven, p. 395); in MGW. 1889, p. 389 wordt ook gezegd dat genoemde aflevering Stecker's kaart van het Z. O. deel van he Abessinische hoogland, alsmede drie route-kaarten van Flegel en twee kaarten van Büttner's reizen (1884—'86) bevat. Over Danckelman's berekening der hoogtemetingsvan Büttner wordt niet gesproken (zie PM.).

⁷⁾ J. Hann, Klima von San Salvador oder Kongo 1883-86. Meteor. Zeitschr 1888, Bd. V p. 394 vlg.

⁸⁾ Ch. S. L. Bateman, The first ascent of the Kasai: Being some records of service under the Lone Star. 4°. 192 pp., 2 kasten en 57 illustr. London, Philip. 1889 Prijs 21 sh. Zie PM. '89, p. 108 en Sc. G. Mag. '89, p. 219.

gedaan van Banana naar het binnenland 1), Kassal over de beschaving in Africa 2) en van Dupont over den Congo 3).

Bateman schildert zijn verblijf op het station Loeëbo (1885-'86), zijn ongang met de inboorlingen, hunne zeden en gebruiken, alsmede den vooruitgang die in vele gedeelten van den Congo-staat is waar te nemen; W. Wolff beschrijft zijne reis naar het opperhoofd Kiamwo aan de Koeango-rivier en geeft daarbij velerlei mededeelingen over land en volk; Kassai (een pseudonym) geeft een overzicht van alles wat er in het Congo-gebied gedaan is, sedert de stichting der Association internatiomale pour l'exploration de l'Afrique tot op heden. Kritiek ontbreekt bij hem niet; zoo beweert hij o. a. dat hetgeen door den Congostaat vernicht werd, voor de geographie veel, maar voor de beschaving zeer weimig te beduiden heest; de stations boven Stanleypool zijn nutteloos of relfs schadelijk omdat zij elkander niet kunnen steunen; de administratie is te duur, de inkomsten zijn te gering, enz. Hij ontwikkelt verder zine denkbeelden over de grondslagen waarop moet worden voortgewerkt: de beneden-Kongo tot Stanleypool blijft de basis. Daar moeten de inboorlingen beschaafd worden en zou men landbouwkoloniën dienen aan te leggen, onder leiding van flinke Europeesche planters; zoo zou men handelsartikelen, zooals koffie en cacao krijgen voor den geregelden uitvoer. Het doel van Dupont, toen hij in 1887 naar Africa ging, was bet Congogebied door eigen aanschouwing te leeren kennen en daar weten-

Het doel van Dupont, toen hij in 1887 naar Africa ging, was het Congogebied door eigen aanschouwing te leeren kennen en daar wetenschappelijke onderzoekingen in te stellen. Hij beschrijft zijne reizen aldaar en deelt de uitkomsten zijner geologische, botanische en ethnographische studien mede; belangrijk is vooral het hoofdstuk over de verspreiding der palmboomen.

Onder de werkzaamheden in de aan het Congo-gebied grenzende streken, verdienen genoemd te worden Jacob's opneming van de Koeiloe-Niadi, met het oog op de bevaarbaarheid dier rivier en hare geschiktheid als verbindingsweg van de kust naar Brazzaville aan den Stanleypool 4), de reis van Crampel in het gebied der Ogowe, Muni en Campo-

¹⁾ W. Wolff, Von Banana zum Kiamwo, 8° IV, 248 pp., 1 kaart, Oldenburg und Lipzig, Schulze, 1889. M. 4. (Refer. van Weyhe, PML. 1889, n°. 1164).

²⁾ P. Kassai, La civilisation africaine 1876—88, 12°, 232 pp.. 2 cartes, Brussel, Mattens 1888. (Refer. van Supan, PML. 1889, n°. 1172).

³⁾ Eduard Dupont, Lettres sur le Congo. Récit d'un voyage scientifique entre l'embuchure du fleuve et le confluent du Kassai. Paris 1889, VIII en 724 pp. (Refer. Proc. 1889, p. 749).

⁴⁾ PM. '89, p. 53; CR. 1888, p. 433.

rivieren ¹), de uitgaven van L. Guiral's aanteekeningen aangaande zijne reizen met Brazza en aan de Ogowe en den Congo ²), Dr. Zint graff's reis naar Adamaua ³), de reizen van Zeuner en Valdau is Kameroen ⁴) en de opnemingen in het mondingsgebied van de Rio de Rey door Bernstorff ⁵). Verdere publicaties en tijdschriftartikelen over Kameroen vindt men opgegeven in PML. 1889 n° 1133—43. Tes overvloede zij hier nogmaals herinnerd aan de bibliographie in ons tijd schrift, waar de artikelen van de meeste binnen- en buitenlandsche tijd schriften worden opgegeven.

In Guinea en Senegambie hebben wij de reizen van Wolf, V. François, Henrici en Kling in het Togogebied, de expedities nas Kong van Binger en Treich-Laplène, die van Festing nas Samory, Colin's opnemingen in Bamboek, de opneming der Whem rivier door Foa, Siciliano en Maignot 6).

De namen van velen dier onderzoekers zijn ons reeds van vroege bekend 7); Dr. L. Wolf maakte op het eind van 1888 een tocht van M station Bismarckburg naar Salaga en kwam daarbij door het tot dusven onbekende gebied van Oedjoeti, en in Januari 1889 naar het naburig landschap Keboe. Von François begon in Dec. 1888 eene reis ow Kpandoe naar Salaga en de Volta en keerde toen weer naar de ku terug; hij trachtte daarbij zooveel mogelijk de juistheid der opneminge zijner eerste reis naar Mosi na te gaan. Ook Henrici en luitenant Klin ondernamen dergelijke reizen (1888), evenals Treich-Laplène (Sept. '88' wiens doel was om van Assinië uitgaande, Binger in Kong aan te tre fen. Dit is gelukt en daardoor is het Mandingo-gebied, van af den Bove Niger tot de kust van Guinea, thans geheel doorkruist. De voorspellin van Supan, dat het Konggebergte waarschijnlijk evenzoo van de kas

¹⁾ PM. '89, p. 152, CR. '89, p. 217. Crampel kwam aan de boven Ivindo eer rechter zijrivier der Ogowe en vervolgens op 2° 15' N. (niet 12° 15' zooals er in Ps staat) aan de boven Lekoli die bij Bongo in den Congo valt (onder den naam va Licona); daarna kwam hij weer aan de kust terug onder veel strijd met de inboorlis gen. In de boven Campo ontdekte hij ook de Tem-rivier, die tot dusver voor een me was gehouden.

²⁾ J. Künckel d'Herculais, Le Congo Français, 18°, 322 pp. met kaart. Par Plon. 1889, fr. 4. Zie de bespreking PM. 1889, p. 231. In het Bull. 1889, p. 279 % wordt een geschiedkundig overzicht gegeven van het onderzoek van het dal der Ogow

³⁾ PM. '89, p. 206. 4) Ib. 206 en 232. 5) lb. 206.

⁶⁾ Zie de korte berichten aangaande die reizen, PM. '89, p. 32, 53, 102 en 206

⁷⁾ TAG. 1889, M. p. 348 en 849.

zal verdwijnen als het Maangebergte, is door Binger's reis vervuld 1), want reeds iets ten O. van de belangrijke zijrivier van den Niger, de Ranie, trok hij over eene kleine naar het Z. stroomende beek, die hij beschouwt als de bron der aan de Ivoorkust uitloopende Lahoe. Twee imetjes, die hij daarna overtrok, bleken de bronrivieren te zijn der Comoë, se zich bij Groot-Bassam in zee stort; het brongebied der rivieren, relke aan de kust van Guinea uitloopen, strekt zich dus 3 tot 4 graden noordelijker uit dan men, op grond van oudere berichten, meende r moeten aannemen. Het juist in Afrika dikwijls voorkomende verschijnzi, dat de waterscheiding tusschen aanzienlijke stroomstelsels gevormd wordt door bijna onmerkbare bodemverheffingen, doet zich ook hier voor. Tesschen het stroomgebied van den Niger en de talrijke rivieren die mar de Ivoor- en de Goudkust loopen bestaat geen bergketen (ook niet aaar den kant van de Volta), maar de waterscheiding wordt gevormd door onbeduidende terreinverheffingen. Het traditioneele Konggebergte boet van de kaart verdwijnen. De stad Kong of Pong — welke tot lasver nog door geen Europeaan bezocht was geworden — telt 12 tot 5000 inwoners, uitsluitend Mohamedanen; zij heeft een levendigen andel. Europeesche waren worden er te koop aangeboden, kaurischelen stofgoud vormen het betaalmiddel. Katoenweverij en indigoewerij zijn er belangrijk; ook heeft men er paardenteelt.

In het O. van het door Binger bezochte gebied zijn enkele hooge oppen, o. a. de Komono (1450 M.); van de Volta strekt zich naar het D. een plateau van ca. 1000 M. hoogte uit, tot het bergmassief van Jauri (1800 M.) ten Z.O. van Wagadoegoe.

Het doel van Dr. Colin's reis, was de opneming van het gebied van amboek, gelegen tusschen de Faleme en de Bafing-rivieren, die bij akel de Senegal vormen, welke hij dan ook in 1888 verricht heeft 2).

¹⁾ Het reisverslag is te vinden in het Bull. 1889, p. 329. Du Niger au golfe de Brinde par Kong, par le capitaine L. G. Binger, met kaart 1:2,500,000 en afzon-brijke orographische schets, 1:8,750,000.

Tie ook mijn overzicht van het vorige jaar (TAG. 1889, M. p. 349) en Wichmann's vericht met schetskaartje der reis van Binger (PM. '90, p. 26). Hij zegt daarin dat de streken waar, volgens Supan, in de eerste plaats onderzoekingen noodig waren, in het Galla- en Somali-land, het Liba-bekken en de Mandingo-landen, door de taten van Teleki en Borelli, Stanley, Crampel en Kund en van Krause, v. François Binger groote uitgestrektheden beter bekend zijn geworden. Het verdient opmerking t, gelijk wij boven zagen, het Maangebergte door Stanley zou zijn teruggevonden.

²⁾ Zie het uitvoerig verslag, met schetskaartje, CR. p. 42.

Eindelijk heeft de Franschman Foa, met twee zijner landgenooten, eer reis gedaan langs de Wheme- of Wheni-rivier, die tot dusver slech in het mondingsgebied onderzocht was. Zij kwamen tot Affame (o° 1 O. L. v. P. en 8° 9′ N.B.) op 98 E. mijlen van de kust. De rivier vom de grens tusschen het koninkrijk Dahomey en Porto Novo; het opgen men gedeelte werd onder Fransch protectoraat gesteld 1).

Men zie verder de titels van werken en tijdschriftartikelen over Guins en Senegambië, PML. 1889, n° 1015—1049.

Ook bij Noord-Afrika keeren de bekende namen terug; Thomso is in 1888 over den Atlas in het brongebied van de zijrivieren der We Draa en der Sus doorgedrongen; op vier plaatsen heeft hij de kam va den Atlas bereikt 2), Foureau heeft, op grond zijner uitgestrekte n (1883—'87) in het gebied der beneden Igharghar, eene kaart der Noo delijke Sahara bewerkt 3); Ch. de Foucauld geeft eene uitgebreis beschrijving van de streken welke hij in Marokko bereisd heeft. Zi werk is eene belangrijke bijdrage tot de nog altijd zeer gebrekkige ke nis van dat land 4). Een der beste kenners van N.W. Afrika, H. Di veyrier, geeft een overzicht van zijne pogingen om het Rif-gebied Marokko te onderzoeken 5).

Ook over de Sahara hebben enkele publicaties het licht gezien, m name het werk van Bonelli, over zijne onderzoekingen in het do Spanje in bezit genomene kustgebied ⁶) en van Bissuel over de Toearegs

¹⁾ Verslag met kaart in CR. p. 537.

²⁾ A. Journey to Southern Morocco and the Atlas Mountains. By Joseph Thoson. Proc. 1889, p. 1 vlg. met kaart. Travels in the Atlas and Southern Morocco: Narrative of Exploration. By Joseph Thomson, London, George Philip and Son 188 484 pp. Index, Maps, Illustrations, Price 9 sh. (Bespreking in Sc. G. Mag. 1889, 330 en MGW. 1889, p. 315).

³⁾ Schaal 1: 1,000,000, Paris, Challamel, 1888, fr, 4. Zie PM. '89, p. 52.

⁴⁾ Vic. Ch de Foucauld, Reconnaissance au Maroc, 1883—'84 4°, 499 pp. M atlas in 21 bl. Paris, Challamel, 1888, fr. 50. Zie de gunstige beoordeeling van werk PM. '89, p. 52.

Over de kaart van Marokko, van denzelfden schrijver, zie TAG. '88, M. p. 235

⁵⁾ H. Duveyrier, La dernière partie inconnue du Littoral de la Méditerranée. L. Rif, 1888, 30 pp. 8°. Paris E. Leroux. (Refer. van Fischer. PML. '89, n° 995).

⁶⁾ E. Bonelli, El Sahara, Descripción geográfica, comercial y agricola desde co Bojador à cabo Blanco, 8° XVI, 280 pp. Madrid, Ministerio de Fomento, 1887. (Rev. Fischer. PML. '89, n°. 1908). 4 Kaarten.

⁷⁾ H. Bissuel, Les Touareg de l'Ouest. 8° XIX, 210 pp. 2 kaarten. Alger Jourds 1888. (Ref. v. Ratzel. PML. '89, n°. 1010).

Boselli heeft ook berichten ingewonnen omtrent het binnenland, van twee inboorlingen die in 1885 door de handelsnederzetting aan de Rio de Oro, waren uitgezonden. De voorstelling door hen van het gebied tuschen 20°—24° N. B. en tot 13° O. L. van Gr. gegeven, is veel gunstiger dan die welke er tot nog van bestond. Er zouden uitgestrekte worden van acacias zijn, en groote kudden van kameelen (1000 stuks), schapen en geiten (10,000), terwijl er ook paarden en runderen moeten workomen; in het landschap Djoead (21° N. B.) moet een groot meer met zoetwater zijn, waar 12,000 menschen wonen die gerst verbouten, enz.

De mededeelingen van Bissuel zijn door hem ontleend aan een zevental gevangen Toearegs. Verdere werken en tijdschriftartikelen zijn opgeteen PML. '89 n° 1000—1014').

Meer in het O. zijn het vooral de werkzaamheden van Italianen, die nae aandacht trekken; zoo hebben wij de publicatie der reeds in 1886 stane reis van den ingenieur L. Bricchetti-Robecchi, van Alexandië naar Siwah²), de mededeelingen over Dr. L. Traversi's reis op it laatst van 1887, naar Dsjimma³), waarheen ook de Franschman J. Porelli eene reis heeft gedaan. Hij kwam van daar zelfs verder dan in zijner voorgangers, nl., volgens zijn eigen mededeeling, tot ongeveer 30'⁴); volgens hem zou de Omo-rivier, die tot nogtoe gehouden end voor de bronrivier der Djoeb, niet naar het O. maar naar het W. kroomen en daarna in zuidelijke richting naar het Sjambara-meer 5). Dier dit laatste weet hij niets bepaalds mede te deelen; volgens de ten door de inboorlingen verstrekte inlichtingen, zou er uit dat meer me rivier naar het Z. W. stroomen; anderen beweerden dat het meer zichtbare uitwatering heeft, dat de zon en de aarde het water optorpen enz. Het meer zou dan blijkbaar niet zeer groot zijn.

De onderzoekingen van Borelli zijn van het Zuiden af, als het ware magevuld door die van Teleki en Von Höhnel. Laatstgenoemde

¹⁾ Men zie ook het artikel *Die Berbern Marokkos*. Von Alfred Kirchhoff. PM.

2 p. 23, outleend aan Quedenfeldt's verhandeling in het Zeitschrift für Ethnologie"

1. 20 en 21.

⁷⁾ PM. 1887, p. 92 en '89 p. 230. — Boll. Soc. Geogr. Ital. 1889 (Mei en Juni), m kaart 1:1,500,000.

⁴⁾ PM. '89, p. 102. - Boll. Soc. Geogr. It. 1888, p. 901.

⁴⁾ CR. 1889, p. 37 met kaartje. Men zie ook de bespreking dier reis PM. '89, p. 79.

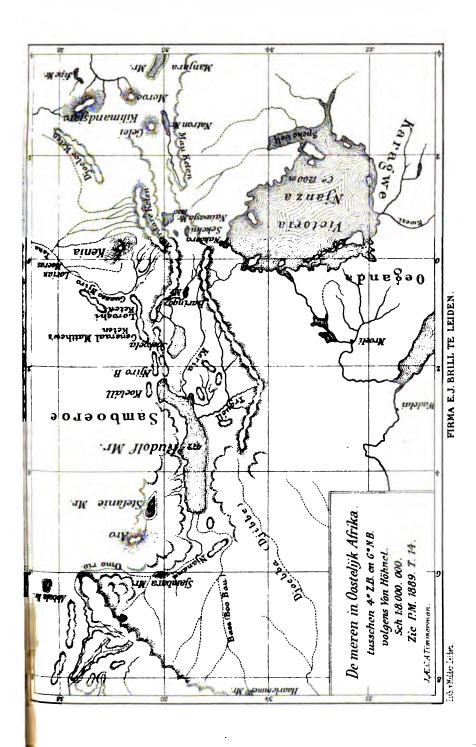
⁵⁾ Dit werd ook door hem medegedeeld op het Geographisch Congres te Parijs (TAG. , p. 607).

geeft in PM. een overzicht 1) van het groote merengebied, dat zich o geveer langs 36° O. L. v. Gr., tusschen 4° Z. B. en 6° N. B. uitstrekt (z de schetskaart). Het ligt in eene inzinking der aardkorst, die in het V begrensd wordt door een bergketen, welke verschillende namen draag in het O. door plateau's en bergen. Het groote Abessinische hooglan wordt naar het Z. steeds smaller en gaat ten slotte over in eene smal strook hoogland, - uit evenwijdige, over het geheel meridionale kete bestaande, - welk ongeveer bij den Kilima-Ndsjaro eindigt. Tussch die ketens ligt de genoemde inzinking, waarin zich verschillende w zamelbekkens voor het water bevinden. Het geheel maakt den indr alsof in een vroeger tijdperk de aardkorst hier gescheurd is, en er na beide zijden gloeiende massa's zijn opgeworpen. Terwijl in het W., 1 het hard worden dier massa's, een lange bergreeks ontstond, had lava in het O. gelegenheid zich tot op grooten afstand over het la uit te breiden en aldus, door zijne nivelleerende werking, het tegt woordige, plateauvormige karakter aan het landschap te geven 2). Vi de hier beschreven strook hoogland loopt het land naar beide kant lager af; zij vormt de natuurlijke waterscheiding tusschen de naar h W. en het O. (Ind. Oceaan) stroomende rivieren. Groote landen w zeer verschillende natuurlijke gesteldheid worden door haar scherp w elkander gescheiden; en om de eigenaardigheid van het oostelijk ligge de, bijna onbekende gebied - dat steeds smaller wordende, ten slot in Kaap Guardafui eindigt - opvallend genoeg te doen uitkomen, von die opheffing ook de grens van het gebied waar de kameel voorkou De landschappen ten W. ervan onderscheiden zich door een welig plantengroei, een heet en vochtig klimaat en een buitengewonen rijkdo aan waterwegen.

De meren in de bovengenoemde inzinking zijn, van het Z. af, h nog niet onderzochte Manjara-meer (4° Z. B.), de door Dr. Fischer b zochte Natron- en Naiwäsja-meren, de kleine Angata nairogua- en Nakoe sekelái-meren, een klein meer, met lauw water onder den evenaar d

¹⁾ Ueber die hydrographische Zugehörigkeit des Rudolfsee-Gebietes. Mit Karte, 14. Von L. Ritter von Höhnel. K. K. Lienienschiffs-Leutenant. PM. 1889, 233 vlg. Zie ook MGW. 1889, p. 333 vlg. Over den tocht van Teleki en Von Höhnheb ik in het overzicht van het vorige jaar (p. 355) gesproken.

²⁾ Merkwaardig is het ook dat er in het gebied van het Rudolf-meer nog the vulkanische werking bestaat (p. 234: Seine vulkanische Umgebung, die, hauptskilich im südlichsten Teile, Beweise regster und noch heute thätiger Feuerkräfte betet, etc.).



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het eerst door bisschop Hannington is bezocht. Dan volgt het Baringomeer, vervolgens de bitterzoutsteppe Soékoeta, waar klaarblijkelijk een meer geweest is, en eindelijk het Rudolf-meer.

Eene zichtbare verbinding tusschen die meren bestaat er niet; ook bebben zij geen afwatering: het Naiwasja-meer ligt het hoogst, nl. op 1830 M. boven den zeespiegel. Naar het Z. en het N. wordt de inzinting lager; het Angata nairógua heest eene hoogte van ca. 1770 M., het Baringo-meer van 1135 M., het Rudolf-meer van 472 M., het Natronmeer van 650 M. Het Manjara-meer, de Angata-nairógua en Nakoerosekelái meren hebben sterk bitterzoutachtig water, dat van het Rudolfmeer is rijk aan soda, maar toch drinkbaar; de andere meren hebben met water. Het grootste dier meren is het Rudolf-meer, tusschen 2° 16' N.B. en 4°47' N.B., met eene oppervlakte van ongeveer 7900 qkm.; de bevolking dier streken noemt het Basso narók, of ook wel Basso of Bass, d.i., groot water", ,,meer". Het neemt van het Z. W. twee rivieren op nl. de Kerio en de Trrguéll, van het N. de Bass en de Niamamm. Na den terugkeer van hunnen tocht zijn de reizigers, door het agaan der bestaande kaarten en door bespreking der zaak met den beenden onderzoeker, kapitein A. Cecchi 1) alsook met den heer Borelli, tie mede onlangs van zijn reis was teruggekeerd, tot de overtuiging geomen, dat de door dezen laatste gedeeltelijk verkende Omo en de ianamm, eene en dezelfde rivier moeten zijn en dat deze door het deine, ondiepe Sjambara-meer (ca. 6° N. B.) moet stroomen (zie boven door Borelli daaromtrent ingewonnen berichten). De kaart van Borelli, de C.R. ondergaat daardoor nogal wijziging, omdat hij het Sjambaraeer veel zuidelijker teekent, ten Z. van 2°; zij gelijkt in bijzonderheden iet veel op die van V. Höhnel. Verder zou er, volgens dezen, geen erbinding tusschen al die meren en het Nijlgebied zijn; ten W. van et Rudolf-meer is er echter eene rivier, die Djoebba of Djibbe heet n die wellicht de hoofdbronrivier der Sobat vormt; ook is V. Höhnel meigd te onderstellen dat de zooëven genoemde Bass uit het, door chaver aldus genoemde, Haarlemmermeer komt, op grond van diens ededeelingen in verband met de bekende hoogten van het terrein in

¹⁾ Het werk van Cecchi, Da Zeila alle frontiere del Caffa (zie de bespreking de twee eerste deelen door Wichmann, in PM. 1886, p. 307, met T. 15, en van derde deel, door Supan, PML. 1887 n°. 558) is thans in het Duitsch verschenen kipzig, Brockhaus, 1888, M. 15), met kaart; het eerste gêdeelte is verkort. (PM. p. 102).

deze streken. Ten slotte is er nog een kleiner meer ten O. van h Rudolf-meer, nl. het Basso ebor, dat den naam Stefanie-meer heeft or vangen; het heeft eene oppervlakte van ca. 930 qkm. en ligt op 5: M. boven den zeespiegel; het water is bitterzout; het meer schijnt af nemen. Men ziet uit dit beknopte uittreksel welke belangrijke resultat door de genoemde expeditie in dit tot dusver zoo weinig bekende gebi zijn verkregen.

Onder de publicaties over het noord-oostelijk gedeelte van Afrika m gen hier nog genoemd worden, het 5de deel van kardinaal Massaj; werk 1), Prof. Durazzo's kaart van het Italiaansch gebied in Oo Afrika 2), Guido Cora's bespreking, met kaart, van Colston's r van Keneh naar Berenice in 1873 3), Stecker's kaart van het Z gedeelte van het Abessinische hoogland 4).

De voornaamste publicaties over N. en N. O. Afrika zijn in PML.' opgegeven (Aegypte en Nubië 944—58, Tripolis en de Atlasland 959—99, Middel-Soedan 1050—1052, Abessinië, Galla- en Somaliland 1053—82). Het zijn o. a. de werken van Schweinfurth b, Virchow Boinet Bey 7), Schmidt b), Staudinger en Paulitschke 16).

¹⁾ Zie TAG. '89, M: p. 353. — PM. '89, p. 126. De schrijver behandelt a verblijf in Kaffa, van 1859 tot 1861, de zeden en gebruiken der bevolking, den a venhandel, de industrie, den handel en de koffiecultuur, alsmede den arbeid der ziedelingen op het gebied van linguistiek en kartographie.

Over Abessinië is later nog verschenen, als Erg. H. n°. 97, zu PM., Dr. K. Dov Kulturzonen von Nord-Abessinien, 34 pp. met kaart. Pr. 2 M. 60 Pf.

²⁾ Rome, Instit. Cartogr. Ital. 1889, l. 1.20. sch. 1:800,000.

³⁾ Cosmos 1889, p. 19. — PM. '89, p. 278.

⁴⁾ PM. '89, p. 205.

⁵⁾ G. Schweinfurth, Bericht über seine während der letzten 15 Jahre in Aegyp ausgeführten Forschungen. Verh. Ges. Erdk. Berlin 1888, p. 388 (n°. 950 en PM. 4 p. 51). — Ueber die Kreideregion der Pyramiden von Gizeh. PM. 1889, p. 1.

⁶⁾ R. Virchow, Land und Leute im alten und neuen Aegypten. Verh. Ges. En Berlin. 1888, p. 428. — (Refer. van Supan, n°. 955).

⁷⁾ A. Boinet Bey, Superficie des diverses cultures de l'Egypte. 1887, 8°. 35 | Kairo 1888. (Refer. v. Supan, n°. 958.)

⁸⁾ Joh. Schmidt, Additamenta ad corporis inscriptionum latinarum vol. VI. (Ref. v. Partsch, no. 965d.)

⁹⁾ P. Staudinger, Im Herzen der Haussaländer. Gr. 8°. X, 758 pp. 1 Route-ka 1:1,000,000. Berl. Landsberger. 1889, M. 13 (Ref. v. Supan, n°. 1051), bespr. in: G. Mag. '89, p. 386.

¹⁰⁾ Ph. Paulitschke, Harar. 8°. IX, 557 pp. 50 Abbild, 1 Tafel und 2 Karte Leipzig, Brockhaus, 1888, M. 15. — (Ref. v. Kirchhoff. n°. 1077).

De arbeid van Schmidt is voor een deel van archaeologischen aard, maar ter beoordeeling van den tegenwoordigen geographischen toestand ran Tunis in vergelijking met dien der oudheid, heeft hij toch - ook in verband met dergelijke onderzoekingen van anderen - veel belang. Neemt men o. a. in aanmerking dat, volgens waarnemingen in verschilknde gedeelten van Afrika gedaan, de meren over het geheel schijnen af te nemen, dan is het opmerkelijk dat men door vergelijking van hetgeen daaromtrent in N.-Afrika wordt bericht, tot het besluit moet komen (zie het referaat) dat de natuurlijke ombrometers, de meren die geen aswatering hebben, in de oudheid niet meer water hebben gehad dan tegenwoordig. De ligging in de oudheid van bewoonde plaatsen in de onmiddellijke nabijheid van den oever dier ondiepe bekkens en de omstandigheid dat de verkeerswegen in de oudheid ontwijfelbaar dwars door de sjots liepen, zijn daarvoor de onweerlegbare bewijzen. Ook in andere opzichten - bijv. voor het verkrijgen van eenig denkbeeld aangaande de dichtheid der bevolking, de richting der wegen, de ontginning van mijnen in de oudheid enz. - hebben bovenbedoelde onderzoekingen hooge waarde.

Staudinger's werk heeft betrekking op zijne reizen in de Haussa-staten in 1885 en '86, maar hij geeft tevens eene uitgebreide beschrijving van die landen, gegrond niet alleen op zijn eigene waarnemingen, maar ook op die van vroegere reizigers in die streken (Barth, Rohlfs e. a.). Zijne mededeelingen over den bodem en het klimaat, de staatkundige toestanden, de bevolking en de voortbrengselen van die afgelegen landen zijn in alle opzichten van veel belang.

Zoo is het ook met Paulitschke's beschrijving van Harar; van Zeila, aan den karavaanweg naar Harar en de wegen naar Sjoa en de daaraan grenzende Galla-landen, reisde hij naar Harar, dat omringd wordt door vruchtbare landen met landbouw en veeteelt. Koffie, ivoor, struisveren, huiden en gom zijn de belangrijkste artikelen van uitvoer, katoenen stoffen en rijst worden ingevoerd. Harar is als vesting de sleutel tot de moordoostelijke Galla-landen en tevens als handelstad in dit gebied van even groote beteekenis als Timboektoe en Koeka in het W.

Volgen wij de kust naar het Z. dan vinden wij in aequatoriaal Oost-Afrika verder geen grootere tochten te vermelden. Ter wille der volledigheid zoemen wij Hervey's tocht in Nov. 1888 op de beneden Tana, over een afstand van 350 k.M. 1), welke rivier in den bovenloop ook bezocht is

l) PM. '89, p. 80.

door J. R. W. Pigott in opdracht der Britsche Oost-Afrikaansche Vereeniging. Het eigenlijke doel, nl. het doordringen tot het Baringo-meer is niet bereikt, ook niet door Swayne en Jackson, die eveneens door bovengenoemde vereeniging waren uitgezonden 1). De bekende Dr. Hans Meyer is er in geslaagd den hoogsten top van den Kilima-Ndsjaro te beklimmen 2). Van belang is ook de plaatsbepaling van Blantyre en van den westelijken oever van het Njassa-meer door O'N eill, waarvan eene oostelijke verschuiving van 7'24" in de ligging van eerstgenoemde plaats, ten opzichte der vroegere bepalingen het gevolg is 3).

Het is hier de plaats om ook eenige woorden te wijden aan de geographische werkzaamheid der zendelingen, waarover trouwens ook ten vorigen jare gesproken werd 4), terwijl in dit overzicht reeds gewezen werd op datgene wat in Massaja's werk over Kaffa daaromtrent wordt medegedeeld (p. 408 noot 1).

Slaan wij bijv. het tijdschrift "Les missions Catholiques" na, dan vinden wij, in bijna elke aflevering, mededeelingen aangaande grootere of kleinere tochten door zendelingen gedaan, met het doel om goed bekend te worden met het terrein hunner toekomstige werkzaamheid. Zoo bevatten de eerste tien nummers van jaargang 1889, het verhaal van een tocht langs de noordoostkust van Afrika door den zendeling Le Roy⁵), zoo geeft Mgr. Livinhac in een schrijven aan kardinaal Lavigerie, een overzicht van de gebeurtenissen van den laatsten tijd in aequatoriaal Afrika⁶), zoo ook bevat het nummer van 15 Febr. een

¹⁾ PM. '89, p. 183 en 230.

²⁾ Ibid. p. 296; TAG. 1889, M. p. 355 en PM. '90 p. 15.

³⁾ A note on some astronomical observations taken upon a journey from Quillimane to the north extremity of lake Nyassa. By Henry E. O'Neill. Sc. G. Mag. 1889, p. 337. De ligging van Blantyre wordt nu 15° 47′ 10″ Z. B. en 35° 2′ 26″ O. L.; de door Stewart bepaalde lengte was 34° 56′ 30″, de bepaling van O'Neill in 1884 leidde tot 35° 3′ 54″ (niet 52″, zooals in PM. p. 207 noot 1 staat). Voor ontdekkingsreizigers van gewicht zijn O'Neill's opmerkingen over het gebruik van chronometers op groots tochten, ter bepaling van lengten. Tegenover de meening van velen, is hij daarvan niet afkeerig; hij beroept zich o.a. op de verwonderlijke overeenstemming zijner lengtebepalingen van Blantyre, in 1884 en 1887 (het verschil bedraagt 1′ 28″).

⁴⁾ TAG. 1889, M. p. 356 (Hetherwick aan het Sjirwa-meer).

⁵⁾ Le long des cotes. De Zanzibar à Lamo, par le R. P. Le Roy, de la Congrégation du Saint-Esprit, missionnaire au Zanguebar. Les Miss. Cath. 1889, 4 Janv. seq.

⁶⁾ Les derniers événements dans l'Afrique équatoriale. Lettre de Mgr. Livinhaca S. Em. le cardinal Lavigerie, Ib. 1889, 15 Mars.

mededeeling van den zendeling Guillemé over de Wabembé's en de zending te Kibanga'), enz.

Eene met het oog op de tegenwoordige toestanden in Afrika, eveneens belangrijke publicatie is het overzicht van de werkzaamheid der Engelsche zudelingen in Oeganda, van af 1844 tot het oogenblik van de verdrijzing der zendelingen in Oct. 1888²).

De Schotsche zendeling R. Cleland heeft verder in Januari 1889, het Milandsji-gebergte tot eene vrij groote hoogte (2300 M.) beklommen; van het zendingsstation Chiradzulo trok hij (28 Dec. '88) door de Tuchira-vlakte, waar de rivier van dien naam ontspringt, die in Z.O. siching naar de Ruo stroomt; deze heeft verder tot zijrivier de Likabulo, door welker dal het eigenlijke Milandsji-gebergte gescheiden wordt van het Chamba-gebergte, dat steeds als een deel ervan beschouwd is; de Tuchira-vlakte is hoogstwaarschijnlijk eenmaal door de wateren van het ists noordelijker liggende Kilwa- of Sjirwameer bedekt geweest. In het gebergte vond Cleland menschen die nog nimmer een blanke gezien hadden, en die op bijna ontoegankelijke plaatsen wonen uit vrees voor de slavenjagers 3).

Een ander zendeling, die zich door zijne uitgestrekte reizen in Zuid-Afrika een grooten naam heeft verworven, nl. F. S. Arnot 4), geest thans in de Proc. een verslag zijner reizen van Natal naar Bihé en Benguella en van daar weder naar het O., naar het brongebied van de Zambezi in den Congo 5). Van die streken geest Arnot eene van de tot dusver bestaande geheel aswijkende voorstelling; de Zambezi ontspringt, volgens

l) La tribu anthropophage des Wabembés. — La mission de Kibanga. Lettre du R. P. Guillemé, etc. Ib. 1889, 15 Févr.

Het tijdschrift wordt tegenwoordig aan de bibliotheek des Genootschaps toegezonden.

2) The Story of the Uganda Mission. 4°. 23 pp., met illustraties. London. Church Lissionary House, 1889, 6 d. — PM. '89, p. 126.

³⁾ St. G. Mag. 1889, p. 438. 4) TAG. 1888, M. p. 235.

⁵⁾ Journey from Natal to Bihé and Benguella, and thence across the Central Place of Africa to the Sources of the Zambesi and Congo. By F. S. Arnot. Proc. 1889, 65 vlg. met kaart 1:4,000,000. Zie de bespreking in PM. '89, p. 103, — Garenzef; or Seven Years' Pioneer Mission Work in Central Africa. By Fred. S. Arnot. Soulon. James E. Hawkins, 1889, 274 pp. Pr. 2 sh. 6 d. (Bespreking in Sc. G. Mag. 1899, p. 331).

De Amerikaansche zendelingen te Bailoendoe en Bihé hebben mede van uit hunne miss talrijke onderzoekingstochten in het omliggende gebied gedaan, waardoor de maningen van Serpa Pinto en van Capello en Ivens worden aangevuld. Zie Currie's micht daarover in Miss. Herald, Boston 1888, p. 293 en PM. '89, p. 31.

hem, niet uit het Dilolo-meer, maar ruim twee graden oostelijker, op het gebergte Border Craig, waarschijnlijk Livingstone's Kaomba, terwijl de rivier in haar bovenloop tot ca. 14° Z. B., Liba heet en - na hare vereeniging met de van het N. O. komende, op ca. 25° O. L. en 12° Z. B. ontspringende Kabompo - den naam Liambai aanneemt en vervolgens als Zambezi door het Barotse-dal stroomt. De oorsprong der Loealaba ligt - op de kaart evenwel nog gestippeld - zeer dicht bij dien der Kabompo, terwijl die rivier, voordat zij zich in het Loepemba-meer stort, links verschillende zijrivieren opneemt (zooals de Loeloea en de Loe boeri), die nabij de bronnen der Liba ontspringen. Iets oostelijker (26°-28° O. L.) ligt een bergland, uit verschillende ketens bestaande (de Ki tangoela-, Moekolla- en Mokabe-bergen), dat het landschap Garengants vormt, hetwelk door de Arabieren nog Katanga wordt genoemd. Dit i de zetel van Msidi - gelijk Arnot hem, in plaats van Msiri, noemt wiens gezag wijd en zijd geëerbiedigd wordt, terwijl ook het vroege zoo machtige rijk van Kazembe, aan het Moero-meer, thans aan het onderworpen is 1). Het verdient nog opmerking dat de vlakte, waart het Dilolo-meer ligt, en ten N. waarvan, op Cameron's route, de brot rivier der Kassai stroomt (ca. 11° Z. B. en 22° O. L. v. G.), door Amd wordt beschreven als eene uitgestrekte zandige vlakte, die in den regen tijd twee of drie voet onder water staat.

Cameron had van die Tsjifoemadsji (of Kifoemadsji) vlakte gehoord maar gemeend dat het een meer was.

De vergelijking der kaart met de groote kaart van Afrika van Justhu Perthes wordt gemakkelijk gemaakt doordat zij op dezelfde schaal i geteekend ²).

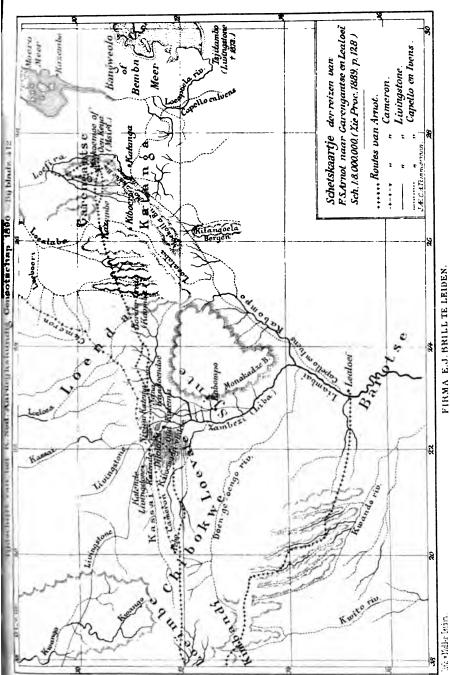
De bekende jager F. C. Selous heeft getracht het landschap Girantse van het Z. te bereiken, gaande door het gebied der Batonga en der Masjoekoeloembwe's en vervolgens door Manica.

Evenmin als indertijd aan Dr. Holub 3) is het aan hem gelukt b

¹⁾ Er ligt ook een Kazembe aan de boven-Loealaba, op het punt waar Arnot d rivier overtrok; het opperhoofd heeft nl. denzelfden naam als de beroemde vorst, d door Livingstone wordt genoemd. Msidi of Msivi is afkomstig uit Oenjamwezi en bes ook thans nog vele inboorlingen van dat land in zijn gevolg.

²⁾ De verschillen zijn dan ook belangrijk; ik heb alleen den eersten druk van J. Pe thes' kaart vergeleken, waar o. a. het Kifoemadaji-meer inderdaad nog te vinden is.

⁸⁾ Zie TAG. 1888, M. p. 169. De Batoka's werden door Holub Matoka's genoem hij is over de Kafoekwe (door hem Loeëngwe genoemd, terwijl Selous Loenge opgest gekomen; Selous kwam tot Minenga dat echter seer dicht bij de rivier ligt.



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land door den laatstgenoemden volkstam bewoond, door te trekken; ook hij werd verraderlijk overvallen en ontsnapte, met achterlating van vele zijner volgelingen, die gedood werden, en van al zijne goederen; door een overhaaste vlucht aan het dreigend gevaar. Den 5den Juni 1888 verliet hij Panda-ma-tenke; van af Wankie (18° Z. B. 26° 45' O. L.) migde hij de Zambezi tot Sjamedza (27° 30' O. L.), van waar hij recht aar het N. trok. Na zijn terugkeer deed hij een tocht in N. W. richting langs de Zambezi door het Marotse-Maboenda rijk en het dal der Makololo tot Lealoer, waarbij hij den weg volgde van den Franschen andeling Coillard (1884). Van belang zijn de opgaven betreffende den koop der rivieren en de topographie, alsmede de opmerking aangaande de nauwkeurigheid der kaart van Ravenstein, de talrijkheid der watervallen in den Zambezi, volgens Dr. Holub, enz. 1).

Dat Selous zich door zijn tegenspoed niet heeft laten afschrikken, blijkt hieruit dat hij in Mei 1889 eene nieuwe reis heeft ondernomen naar het Masjonaland (ca. 18° Z. B., 30°—32° O. L.) en dat hij ook het plan om van de Zambezi naar Garengantse en van daar langs de Loealaba tot Njangwe door te dringen, nog niet heeft opgegeven 2).

Behalve de bovengenoemde grootere reizen in Middel- en Zuid-Afrika zijn er nog eenige kleinere tochten te vermelden, nl. die van de zendelingen Wilder en Bates (Juni-Sept. 1888) van Sosala naar den zetel van Goegoenjana in het Gaza-land 3), van den zendeling Stocker (1888) in het Drakengebergte, tusschen Natal en Basoetoland 4), waarbij hij het hoogste punt van dat gebergte, de Champagne Castle, beklom en verscheidene hoogtemetingen deed en eindelijk E. Hermann's tocht van Angra Pequena naar Bethanië 5).

Op Madagaskar heeft men in de laatste jaren gehad, de opnemingen in het gebied der Betsiboka-rivier door E. Cortese (1887), de triangulatie der provinciën Imernia en Betsileo door den Jezuttenpater Roblet, de expeditie van Catat en Foucart (1889) en den zeer belangnijken tocht van den zendeling J. Nielsen-Lund (1887) in het zuidelijk gedeelte van het eiland, waar nog geen Europeaan geweest was.

¹⁾ Letters from Mr. F. C. Selous on his Journeys to the Kafukwe River and the Upper Zambesi. Proc. 1889, p. 216 vlg, met kaart.

²⁾ PM. '89, p. 207. - Fortnightly Review 1889, XLV, p. 661.

⁸⁾ PM. '89, p. 126.

⁴⁾ Ibid p. 126 en 279. — Alpine Journal XIV, p. 56 en 397, met kaart.

⁵⁾ PM. '89, p. 208. Deutsche Kolonialzeitung 1889, n°. 26 en 27.

Het is gebleken dat zich daar niet, zooals men meende, eene heuvel achtige vlakte uitstrekt, maar een bergland van meer dan 1200 M. hoogte 1). Ook geeft kapitein Le Fournier eene uitvoerige beschrijving van den weg van Tamatave naar Antananarivo 2), en heeft L. H. Ran some eene opneming gedaan van de Antanambalana-rivier 3), in he N. O. gedeelte van het eiland; zij loopt uit in de Antongil-baai.

Van de resultaten der reis van Dr. K. W. Schmidt naar de beide westelijkste Komoren, Angasaija (Groot-Komoro) en Mohilla (Moali), it 1888, wordt door Langhans een overzicht gegeven, met betrekking tot de geographie en de kartographie dier eilanden, bewerkt naa Schmidt's dagboek 4), die gedeelten van de genoemde eilanden heef bezocht waar nog geen blanke geweest was.

Laat ons ten slotte nog in het kort de belangrijkste publicaties be treffende Oost- en Zuid Afrika nagaan. Op kartographisch gebied hebber wij vooreerst de uitstekende kaart van een deel van Oost-Afrika van Ravenstein en zijne kritische bespreking der opnemingen van he Bangweolo-meer door Livingstone en Giraud 5), alsmede Jeppe's kaar der Transvaal 6), waarop belangrijke afwijkingen voorkomen van de be staande kaarten. Daar hij gebruik heeft kunnen maken van opnemingen

¹⁾ Zie verder over deze reizen PM. '89, p. 104, 208 en 279. — La géographie l Sept. '89 (Catat en Foucart), Boll. Soc. Geogr. It. Sept.—Dec. 1888 (Cortese) Antananarivo Annual 1888, p. 440 (Nielsen) en CR. '89, p. 71 (Roblet: La Carl de Madagascar)

²⁾ PM. '89, 104. Rev. marit. Mars. 1889, p. 516.

³⁾ PM. '89, p. 208. Proc. 1889, p. 295. The River Antanambalana, Madagasca By L. H. Ransome, met kaart.

⁴⁾ Dr. K. W. Schmidt's Reisen auf den westlichen Komoren. Nach seinem Tagebar bearbeitet von Paul Langhans PM. '90, p. 11. Mit Karte, T. 1.

⁵⁾ E. G. Ravenstein, Map of part of Eastern Africa. London, Philip. 1889; 1 sh., schaal 1:500,000. De kaart omvat het gebied tusschen 1° N. B. en 5° Z. B. en va de kust tot den oostelijken oever van het Victoria Njanza. (Bespreking PM. '89, p. 231. Dr. Livingstone and lake Bangweolo (with maps). By E. G. Ravenstein. Sc. (Mag. 1889, p. 125.

⁶⁾ Fr. Jeppe, Map of the Transvaal or S. A. Republic and surrounding territorie London, Dulau, 42 sh. Sch. 1:1,000,000. De kaart stelt het gebied voor tusschen 20 en 31° Z B. en 22½-33° O. L. v. Gr., nl. de Transvaal, den Oranje Vrijstaat, Basoet land, Natal met Zoeloeland, Oost- en Westgriqualand met gedeelten der Kaapkolonie de oostelijke streken van Britsch Betsjoeanaland, groote stukken van het Matabelerij en het aan Transvaal grenzende Portugeesche gebied. (Bespreking PM. '89, p. 207).

e gegevens, die tot nogtoe niet waren gepubliceerd mag men aannemen da hij vele fouten heeft vermeden, welke op andere kaarten, door gebra aan juiste gegevens, bij hare vervaardiging noodzakelijk moeten workomen.

De voornaamste bronnen en oorspronkelijke opnemingen waarnaar hij best gewerkt, worden door Jeppe vermeld, terwijl zijne kaart ook met bet oog op de staatkundige indeeling des lands, de aanwijzing der plaatsen waar goud voorkomt, van de wegen, telegraaflijnen en spoorwegen enz. van veel gewicht is.

Verder geeft Dr. O. Baumann, die in 1888 (Aug.-Oct.) heeft deelgenomen aan de expeditie van Dr. H. Meyer, eene beschrijving en eene taat van het landschap Oesambara 1). De schetskaart (T. 3) bij het eeste opstel gevoegd, was vervaardigd naar persoonlijke herinneringen, dan de aanteekeningen, welke de reiziger had gemaakt, verloren waren gegaan, toen hij 15 Oct. 1888 door de negersoldaten van den hoofdman Bosjiri, werd overvallen. Later zijn zij door de bemoeiingen van den Engelschen consul te Zanzibar, kolonel Euan-Smith, nog terecht gekomen en heeft Baumann eene kaart kunnen maken (T. 16) op grond van astronomische plaatsbepalingen, routeopnemingen, barometrische hoogtemetingen enz. Oesambara, gelegen tusschen de Mkomasi- en Panganinvier in het Z. en de Oemba-rivier in het N., vormt een gedeelte van de kristallijne gebergten, die zich langs de kust van den Indischen Oceaan uitstrekken, ervan gescheiden door de jongere aszettingen van de eigenlijke kuststreek; terwijl zich aan de andere zijde het zandsteenplateau van het binnenland bevindt. Die gebergten vormen echter niet, moals de leisteengebergten aan de westkust, een onafgebroken geheel, maar verheffen zich zonder samenhang uit de vlakten en zijn gescheiden door meer of minder breede strooken laagland. Het kustgebied is gedeeltelijk vlak en zandig, en bestaat ten deele uit koraalrots.

Zoowel het geologische overzicht als de beschrijving van den plantengroei, de rivieren en de bevolking zijn ook hierom van gewicht omdat Banmann in streken geweest is die tot nogtoe volkomen onbekend waren. Eene andere publicatie, welke de aandacht verdient, is het artikel van den zooevengenoemden Dr. Schmidt over de bodengesteldheid van

¹⁾ Usambara von Dr. Oscar Baumann. Mit Karte. T. 8. PM. 1889, p. 41. (Sepreking in Sc. G. Mag. 1889, p. 268).

Kerte von Usambara von Dr. Oscar Baumann. Mit Karte, T. 16. PM. 1889, p. 257.

Duitsch Oost-Afrika 1), terwijl ook de mededeeling van Von Steinacke over het Duitsche gebied in Z. W. Afrika vermeld moet worden 2), zo wel omdat, volgens dezen schrijver, het genoemde gebied een zeer blangrijk gedeelte van de Duitsche koloniën vormt, als om de kaart wel hij naar eigen opnemingen en vroegere kaarten heeft vervaardigd. Lei men het artikel aandachtig na dan is er ten slotte niet veel waaruit di belangrijkheid blijkt; het klimaat is gezond, maar het land brengt dit oogenblik maar weinig voort, voornamelijk huiden en hoorns; of is er in den drogen tijd gebrek aan water en zijn alle rivieren dan droof voor landbouw en veeteelt zou er in beperkte mate echter wel gelege heid zijn. enz. —

De werken en kaarten over Oost aequatoriaal Afrika zijn opgegeven i PML. 1889, N°. 1083—1129, die over West aequatoriaal Afrika onde N°. 1130—1179, die over Zuid-Afrika en de eilanden onder N°. 1180-1242. Daar worden genoemd artikelen over verschillende der boven be sprokene expedities in onderscheidene tijdschriften, en enkele afzonde lijke werken van grooteren omvang, o. a. dat van K. Dove over be klimaat van Zuid-Afrika³), van Theal over de geschiedenis van Z Afrika⁴), Klossel's beschrijving der Zuid-Afrikaansche republieken, me het oog op de behoeften van den koopman en den emigrant⁵), de be schrijvingen van de Transvaal en de goudvelden door Heitmann⁶)

¹⁾ Die Bodenverhältnisse Deutsch Ost-Afrikas. Von Dr. K. W. Schmidt, PN '89, p. 81.

²⁾ Aus dem südwestafrikanischen Schutzyebiet. Von Freiherrn V. Steinäcker. M. Karte, T. 5. PM. '89, p. 89.

⁸⁾ K. Dove, Das Klima des aussertropischen Südafrika mit Berücksichtigung de geographischen und wirtschaftlichen Beziehungen nach klimatischen Provinzen dargestellt mit 3 Kartenbeilagen. 8°. VIII, 160 pp. Göttingen Ruprecht, 1888, M. 4,40. (Referm van Partsch PML. '89, n°. 1188 en van H. Reiter in ZWG. 1889, VII Litt. Blat p. 48).

Over het klimaat van Zuid-Afrika, beschouwd uit het oogpunt zijner geschiktheid voo Hollandsche borstlijders, verscheen een opstel van F. W. Andriessen, in het Albunder Natuur, Februari 1890.

⁴⁾ G. M. Theal, History of South Africa (1691—1795). With two Charts. London Swan, Sonnenschein & C°. 1888, 8°. pp. XVII and 419. Price 15 sh. (Besprekin) Proc. 1889, p. 120).

⁵⁾ M. H. Klössel, Die südafrikanischen Republiken. Gr. 8°. VIII, 206 pp. 1 Kart in 1:12,500,000. Leipzig. Ed. Heinr. Mayer 1888, M. 4,80 (Refer. van Weyhe, n°. 1203)

⁶⁾ G. Heitmann, Transvaal, das Land, seine Bewohner und seine wirtschaftliche Verhältnisse. 12°. 112 pp. mit 1 Karte, Leipzig. G. Weigel. 1888, M. 1.

Ford's en Beize's. Wij vermeinen mog hierbij het reeds in oos tijdskrit angekondigde werk van Dr. H. Elinak ever de Transvaal en dt va Henda P. N. Maller over Zuid-Afrika L.

Order die werken over de eilinden noem ik de kaart van Madagasut door Roblet 4., het geologisch overzicht van dat eiland door fortese 3, de beschrijving van Socotta door Prof. Bayley Balfour, it in 1880 een wetenschappelijk onderzoek van dat eiland heeft ingetiid 9 en verschillende andere werken van grooteren omvang, zooals it van Genin, Guet, Hue, Simond, Le Chartier en Pelletin enz 3. Vermelding verdient het werk van Edwardes over de Catrische eilanden 3.

Afgesisten haif Februari.

¹⁾ S. P. Ford, The Transmal Sc. G. Mag. 1889, p. 77-81.

⁵⁾ J. Beta, Witnesterarand Goldwids. The Banket Formation, its probable origin mi punt position, 8°. 18 pp. Johannesburg 1888. (Refer. van A. Schenck, n°. 1806)

5) Iransval en ambiggende landen, door Dr. H. Blink. Met kaart van Z. Afrika.

5th 1:5,000,000. Amsterdam J. H. de Bussy 1889, 116 pp. (TAG. 1889, M. p. 470).

Hendrik P. N. Muller, Zuid-Afrika. Reisherinneringen, Leiden, A. W. Sijt-

Hendrik P. N. Muller, Zuid-Afrika. Reinkerinneringen, Leiden, A. W. Sylof - Dit seer learname en onderhoudend geschreven werk, wordt ook in Zuid-Afrika ing gevandeerd, zooals blijkt uit de bespreking ervan in de "Zuid-Afrikaan". (Zie "Werddharger" van 16 Mei 1890, p. 12).

D. Roblet, Carte de Madagascar, Octobre 1885. 1:1,000,000; dessinée et gravée
 R. Hassermann, Paris, Lecène et Oudin, 1888. (Refer. van Lüddecke, PML. 'S9, nº. 1311). Zie ook CR. 1889, p. 71—75.

⁵⁾ E. Cortes e. Appunti Geologici sull'isola di Madagascar. Boll. R. Com. geol. 1888. — 8°, 28 pp. — Kaart 1:8,000,000. (Uitvoerig refer. van Keilhack. Ibid. n°. 1238).

J. Bayley Balfour, Botany of Socotra. 4°, LXXV en 446 pp., 100 platen at 1 kmrt, 1:250,000, Edinburgh 1888. — Trans. R. Soc. Edinburgh XXXI. (Uitvoerig 1986. v. Sapan, PML. '89, u°. 1223).

⁷⁾ E. Genin, Madagascar, les îles Comores, Mayotte, La Résnion. 8°, 800 pp. Priis, Degorce, 1889, fr. 2. — J. Guét, Les origines de l'île Bourbon et de la colonisation française à Madagascar. 8°, 803 pp. avec cartes. Paris, Bayle, 1888, fr. 6. — P. Hue, La Résnion et Madagascar. 8°, 289 pp. Paris, Lecène & Oudin, 1888. — C. Simond, Madagascar. 12°, 72 pp. Paris, Lecène & Oudin. — H. Le Chartier & G. Pellerin, Madagascar depuis sa découverte jusqu'à nos jours. 16°, 888 pp. 2005. Paris, Jouvet, 1888, fr. 8,50.

⁵⁾ Rides and Studies in the Canary Islands. By Charles Edwardes. Illustrated XX and 865 pp. London, T. Fisher Unwin, 1888, Pr. 10 sh. 6 d. (Bespreking in & 6. Mag. '89, p. 388).

AMERIKA.

In Noord-Amerika hebben wij de reizen van Topham in Alaska, de geographische opnemingen in Canada, de Hemenway-expeditie in Arizona en het onderzoek van het brongebied der Mississippi door Brower.

De reis van Topham in Juli 1888, had ten doel de beklimming van den Mount St. Elias 1), welke twee jaren vroeger was beproefd door Seton Karr 2). Ook hij slaagde er niet in den top te bereiken; hij kwam tot 11461 voet (3491 M.) en schat de hoogte van den berg op 19500 voet (5940 M.), overeenkomstig de opgave van Allen, zoodat het de hoogste berg in N. Amerika zou zijn 3). Het zou hem echter niet verwonderen indien sommige toppen, die van Jakatat uit zichtbaar zijn, maar verder in het binnenland liggen, hooger waren. Een groot gedeelte van het opstel is gewijd an de beschrijving der gletschers welke om den berg liggen, waarbij hij de opmerking maakt dat alles er op schijnt te wijzen dat het langdurige ijstijdperk, waarin het land verkeerd heeft, thans zijn einde nadert (p. 430). In de op de voordracht gevolgde bespreking wees Freshfield er op dat de omtrek van den St. Elias, volgent de photographische af beeldingen, geen enkele der kenmerkende vormen

¹⁾ A Visit to the Glaciers of Alaska and Mount St. Elias. By Harold W. Topham, Proc. '89, p. 424. Met kaart.

Ik maak hier tevens melding van het vinden van een bewerkt stuk jadeït, een steen die met de nephriet verwant is (zie Neumayr, Erdgeschichte II, p. 881), door luitenam G. T. Emmons, in Alaska; hij hoopt de juiste plaats te zullen vinden waar de jadeït in Alaska voorkomt (Sc. G. Mag. '89, p. 823, Science 1 Febr. 1889).

²⁾ TAG. 1887, M. p. 425 en '88, M. p. 98.

⁸⁾ Men zal zich herinneren dat Murray als hoogsten berg van Noord-Amerika der Wrangel-berg aanneemt, dien hij op 6100 M. stelt (TAG. '89, p. 858); volgens Allen, met wien Seton-Karr en Topham het eens zijn, is die berg 17,500 voet hoog, d. i 5885 M. Men vergelijke over Allen's tocht langs de Koper- of Atna-rivier, in 1885, om tijdschrift 1886 (III), p. 284. De daar uitgesproken wensch dat er eene meer juiste en volledige kaart van Alaska mocht worden gepubliceerd, dan die, welke er tegenwoordig van bestaan, is thans vervuld. Blijkens het uitvoerige referaat (1424) van Supan in PML. 1889, is uitgegeven: H. T. Allen, Report of an Expedition in the Territory of Alaska. 8°, 172 pp. Washington 1887, 1 algemeene kaart, schaal 1:950,400 en 5 kaarten, sch. 1:253,440. De uitkomsten dier reis zijn van groot gewicht voor de kennis van Alaska.

van een vulkaan vertoont; hij was overtuigd dat, al mogen er ook spora van vulkanische werking in de buurt worden gevonden, de berg zelf niet van vulcanischen oorsprong is.

ln Canada zijn in 1888 weder belangrijke geographische en geologische opnemingen gedaan onder leiding van E. Deville en A. R. C. Stlwyn 1). Ogilvy overwinterde aan den oever der Joekon-rivier, nabij de grens van Alaska, waar hij astronomische plaatsbepalingen deed; ook bepaalde hij, in het voorjaar van 1888, de waterscheiding tusschen die nivier en de Mackenzie²). Fawcett onderzocht het gebied tusschen de Athabasca- en de Churchill-rivier, waardoor verband werd gebracht tuschen de opnemingen van Ogilvy aan de Athabasca- en Klotz aan de Nelson-rivier. A. Saint-Cyr deed eene opmeting der grens van het Rocky-Mountain Park. Dr. G. M. Dawson zette zijne geologische opnemingen in zuidelijk Columbia voort, terwijl A. Bowman onderzoekingen deed in het district Westminster. R. G. Mc. Connell trok in Juni 1887 langs de Liard-rivier, overwinterde in het fort Providence aan de Mackenzie, voer in den zomer van 1888 die rivier af tot aan de monding der Peel-rivier, die hij volgde tot het fort Mc. Pherson. Van hier trok hij over de waterscheiding naar de Joekon, die hij tot aan hare bron opvoer, om eindelijk over den Chilcootpas de kust te bereiken, zoodat hij in 2 jaren tijds eene rondreis van 4200 E. mijlen (6700 km.) heeft gedaan. Dr. R. Bell zette zijne opnemingen voort tusschen de Montreal-rivier en het Huron-meer, terwijl A. P. Low weder aan de oostkust der Hudsonsbaai werkzaam was 3).

Behalve die opnemingen van regeeringswege had er ook, door Spotswood Green, eene verkenning plaats in het gletschergebied der Selkirk Range⁴), daar waar de Canadian Pacific Railway die keten snijdt. Van Mt. Sir Donald (10,645 f. = 3244 m.), gelegen op 51° 15′ N. B. en

¹⁾ PM. 1889, p. 254, A. R. C. Selwyn, Summary reports of the geological survey for the year 1888. 8°, 41 pp. Ottawa 1889.

³⁾ Zie over Ogilvy TAG. 1887, M. p. 427.

⁸⁾ Vergelijk mijn overzicht van het vorige jaar, p. 860, noot 2, alsmede A. P. Low, Exploration of Country between Lake Winnipeg and Hudsons-Bay. 24 pp. en R. Bell, Exploration of portions of the Attawapishkat and Albany Rivers. 89 pp. Beide in Geol. and Nat. Hist. Surv. of Canada. Ann. Rep. II. F. G. (Refer. van Supan, 1487a en 1437b. PML. 1889).

Men zie ook het uittreksel uit Dawson's rapport in Sc. G. Mag. '89, p. 440

⁴⁾ Explorations in the Glacier Regions of the Selkirk Range, British Columbia, in 1888. By Rev. W. Spotswood Green. Proc. '89, p. 158. Met kaart.

en 117° 25' W. L. v. Gr., overzag Green een sneeuw- en ijsveld, aan den voet van den berg, ter lengte van 10 E. mijlen; naar het Z. strekten zich, zoover het oog reikte, ketens met tallooze sneeuwtoppen uit. De gletschers in het door hem opgenomen gebied vertoonen sporen van inkrimping (p. 162). In het dal beneden den Illecellewaet-gletscher (een weinig ten W. van Mt. Sir Donald), strekt zich een zeer groote moraine uit. Hoewel door den aanleg van den spoorweg, in deze streken eenige opnemingen hebben plaats gehad, is Green doorgedrongen in een gebied dat zoo goed als geheel onbekend was.

De Hemenway-expeditie is aan de lezers van ons tijdschrift, door de mededeelingen van Dr. ten Kate, genoegzaam bekend 1). Wat het onderzoek der bronnen van den Mississippi betreft, zal men zich herinneren dat kapitein Glazier indertijd beweerde die ontdekt te hebben, hetgeen van verschillende zijden tegenspraak uitlokte 2). Nu heeft Glazier, in het werk over zijne reizen 3), zijne bewering volgehouden, tengevolge waarvan de Minnesota Historical Society, om die zaak voorgoed te doen uitmaken, eene expeditie naar het brongebied der rivier heeft gezonden, onder leiding van Prof. J. V. Brower. Deze keerde in Mei '89 naar St. Paul terug met de verassende mededeeling dat noch Lake Ithasca, noch Elk Lake (Lake Glazier), noch Whipple Lake het eigenlijke bronmeer vormen, maar dat twee meren ten W. van het Ithasca-meer, die 100 voet hooger dan dit laatste liggen, als de ware bronmeren beschouwd moet worden.

De gebeurtenissen met het gebied van Oklahoma zullen den lezers wel uit de dagbladen bekend zijn; ik verwijs den belangstellende naar twee publicaties daaromtrent, welke in de noot worden opgegeven 4).

¹⁾ TAG. 1889, M. p. 205 en 216.

²⁾ TAG. 1885, M. p. 885, '86, M. p. 896, '87, M. p. 481. Zie daarover ook G. Brühl, Die Hemenway-Expedition. Globus 1889, p. 11. S. Baxter, The Old New World. An account of the explorations of the Hemenway S. W. arch. expedition. Salem (Massach.) 1888.

Th. Wilson, The Hememony Expedition in Arizona. Nature 1888, p. 629.

⁵⁾ W. Glazier, Down the Great River. 8°, 448, LIII pp. Met kaarten. Philadel-phia, Hubbard, 1888. (Zie PM. 1889, p. 280).

⁴⁾ Oklahoma. Von H. Wichmann. PM. '89, p. 149. Met kaart. L'Oklahoma. Territoire Indien nouvellement annexé aux Etats-Unis par le Dr. Comte H. Meyners d'Estrey. Rev. géogr. Juillet 1889, p. 6.

Men zie ook het belangrijke opstel in ons tijdschrift jaargang 1889, M. p. 582,

Over de geologische opnemingen in de Vereenigde Staten werd door den directeur der Geological Survey, Majoor Powel, een verslag uitgebracht, waarvan in Science (28 Sept.) een beknopt overzicht wordt gegeven 1). Er zijn in 1888 omstreeks 52,000 [] E. mijlen opgenomen. Dr. A. Hague deed geologische onderzoekingen in het gebied van het Yellowstone Park, Prof. N. S. Shaler heeft de streken opgenomen waar moerassen voorkomen en die in de Vereenigde Staten eene oppervlakte beslaan van meer dan 100,000 🗆 E. mijlen. Een groot gedeelte daarvan zou, door afvoer van het overtollige water, productief gemaakt kunnen worden. Op vele plaatsen komen bruinkool en ijzer voor en in Zuid-Carolina en Georgia vindt men phosphaten die in toenemende hoerecheden worden gewonnen. De sedert overleden Prof. Roland D. Irving heeft die metamorphische gesteenten onderzocht, welker ouderdom, tengevolge der vernietiging hunner fossielen, onzeker is en hij heeft daarvoor de Green Mountains van Vermont en Massachusetts genomen. Prof. T. C. Chamberlain heeft de bekkens onderzocht die door werking van het ijs gevormd zijn. Tijdens het einde van het ijstijdperk bevond zich, in het gebied waar nu de noordelijke Red River en de Saskatchewan stroomen, een groot meer, dat men het Agassiz-meer genoemd heeft. Het gedeelte dat binnen het gebied der Vereenigde Staten ligt is onderzocht door Warren Upham, den assistent van Chamberlain, in aansluiting aan de geologische opnemingen in Canada. Majoor Powel stelt in zijn rapport ook eene nieuwe indeeling der gronden voor, die hij verdeelt in endogene en exogene. De eerstgenoemde hebben hun oorsprong te danken aan de naburige vaste gesteenten, de laatste zijn gevormd uit bestanddeelen die van elders zijn aangevoerd. De endogene worden aangeduid met de namen der gesteenten van welke zij afkomstig zijn, de exogene worden genoemd naar de werkingen die ze hebben doen ontstaan, bijv. lacustrine gronden, aangeslibte gronden, veengronden enz.

Onder de talrijke werken en kaarten over Noord-Amerika, die in het Litteraturbericht van Petermann's Mittheilingen (1889 n° 1395—1516) worden opgegeven, zij de aandacht gevestigd op de kaarten der Coast Survey in Canada en de Vereenigde Staten en der topographische opnemingen in verschillende staten aldaar, op Vuillemin's atlas der groote

lets over het Indiaansche vraagstuk in de Vereenigde Staten, door Dr. H. F. C.

¹⁾ Sc. G. Mag, '89, p. 205.

riviergebieden van Noord- en Zuid-Amerika 1), Packard's werken over Labrador 2), Von Danckelman's meteorologische waarnemingen aldaar 3), de werken van Chapman en Chalmers over de mineralen en de geologische gesteldheid van Canada en Nieuw-Brunswijk 4) en de overzichten betreffende den landbouw in eerstgenoemd land 5). Uit het overzicht van Fream blijkt dat Canada, voor zijne drie voornaamste producten, graan, vleesch en kaas, reeds eene plaats op de wereldmarkt heeft verworven. In Nieuw-Schotland, met zijne uitmuntende weiden, heeft de veeteelt reeds eene belangrijke ontwikkeling verkregen; landbouw op de kleigronden aan de Fundy-baai en ooftcultuur nemen toe. In Nieuw-Brunswijk hebben houthandel, scheepsbouw en vischvangst nog de overhand, maar de dalgronden ("Intervale Lands") zijn ook voor landbouw zeer geschikt.

Het Prince Edward eiland heeft de beste weiden van Amerika, hoewel de veeteelt hier nog op lagen trap staat. In Quebec is thans ook het land aan den noordelijken oever der St. Laurens-rivier, tusschen het St. John-meer en de Ottawa, eene oppervlakte beslaande van omstreeks 1½ mill. hectaren, voor de cultuur toegankelijk gemaakt; ongeveer 900,000 hect. zijn voor landbouw of veeteelt geschikt.

In Ontario zijn 8,719,225 hect. of 23 perc. der geheele oppervlakte in bezit genomen, waarvan 4,443,343 hect. in ontginning zijn gebracht, terwijl 3,415,132 hect. met woud bezet zijn en de overige niet gebruikt

¹⁾ A. Vuillemin, Atlas orographique et hydrographique des bassins des grands fleuves de l'Amérique du Nord et de l'Amérique du Sud. 5 bl. & fr. 0,75.

²⁾ A. S. Packard, Who first saw the Labrador Coast? Bull. Americ. Geogr. Soc. 1888, XX, n°. 2, p. 197—207. — The geographical evolution of Labrador. Ibid. p. 208—280, met kaarten. — A summer's cruise to northern Labrador. I From Boston to Square Island. Ibid. n°. 3, p. 887 en 445 vlg. met kaart.

³⁾ Von Danckelman, Meteorologische Beobachtungen in Labrador 1 Sept. 1888 bis 31 Dec. 1684. Deutsche überseeische meteor. Beob. 1888. Heft I, p. VIII-XI und 1—48. Men zie het beknopte overzicht met tabel, door Supan in PM. '89, p. 25.

⁴⁾ E. J. Chapman, The minerals and geology of Central Canada, compr. the Provinces of Ontario and Quebec. Toronto 1888, Pr. 15 sh.

R. Chalmers, Surface Geology of Northern New Brunswick and South-eastern Quebec. Geol. and nat. hist. surv. of Canada. Ann. Rep. II, M. 1887, 2 kaarten 1:258,440. (Kort refer. v. Supan, no. 1445).

Statistical Abstract for the year 1887. Uitgeg. door het landbouw-departement.
 pp. 8°, Ottawa 1888.

W. Fream, Agricultural Canada. Uitgeg. als voren. 64 pp. 1 kaart, 1889. (Refer. v. Supan, n°. 1463).

woden; er waren in 1887 ruim f mill. paarden, bijna 2 mill. runderen, 14 mill. schapen en 0,8 mill. varkens. In Manitoba is het bouwland in de lauste jaren zeer toegenomen; in 1884 werd op 124,243 hect. tarwe, op 53,823 hect. haver en op 16,530 hect. gerst verbouwd; in 1888 waren de getallen resp. 210,000, 68,800 en 28,300. In het Westen is het terniorium Alberta belangrijk om de veeteelt in het gebied der zgn. Chimokwinden, ten Z. van de Red Deer-rivier en ten O. van het Rotsgebergie. De genoemde winden, die uit het W. of Z. W. waaien, zijn, zoorel des zomers als des winters, droog en verhoogen in het laatsgenoemde jurgenijde de temperatuur zeer sterk (dikwijls van -30° tot ± 4°), modat de sneeuw ook spoedig smelt. Er zijn ruim 100,000 stuks rund-100, 40,000 schapen en 20,000 paarden. Die plateau-landschappen in Britisch-Columbia kunnen alleen voor den landbouw gewonnen worden door kunstmatige besproeiing en dan nog slechts voor zoover zij in het Z zijn gelegen. Vruchtbaar zijn de omstreken van Victoria en Comox op Vancouver, de districten van New-Westminster en Yale, het Spallumcheen- en het Okanagan-dal en het Kootenay-district 1). Van beteekenis wr Canada zijn ook zijne delfstoffen: steenkool en koper aan het Boven-Meer, petroleum in het Mackenzie-gebied.

Onder de overige werken mogen hier nog genoemd worden die van Davidson, Harcourt en Johnson over Florida²), Davis' beschrijving van Nieuw-Engeland³), Waldo's artikel over de gemiddelde snelleid van den wind in de verschillende gedeelten der Vereenigde Staten⁴),

¹⁾ Zie over het Kootenay-gebied, TAG. 1885, M. p. 488 en 648.

In CR. '89, p. 208 geeft D. Bellet een beknopt overzicht van de kolonisatie van finisch Columbia. Er is eene maatschappij voor de ontginning van het Kootenay-gebied opgericht, welke vruchtbare streek — eene der rijkste van Amerika — door een kanaal tusschen de Kootenay-rivier en het Columbia-meer, in verbinding wordt gebracht met de groote verkeerswegen.

³⁾ J. W. Davidson, The Florida of To-day. A guide for Tourists and Settlers.
34 pp. with maps and illustrations. New-York and London. D. Appelton & Co. 1889.
47. 5 sh. (Beknopte aankondigingen in Sc. G. Mag. '89, p. 223 en Proc. '89, p. 189).
H. Harcourt, Home life in Florida. 12°, 433 pp. Louisville, Ky. Morton & Co. 1889. Pr. doll. 1,25.

L. C. Johnson, The Structure of Florida. Amer. Journ. of Science 1888, p. 36. (Refer v. Supan, n°. 1494, PML. 1889).

¹⁾ W. M. Davis, The physical features of New England, voorkomende in S. H. Saiders werk »The Butterflies of New England" Cambridge, Mass. 1888, p. 75-89, 24 & kaarten (Ref. v. Supan, n°. 1492).

F. Waldo, Mittlere Windgeschwindigkeiten in den Vereinigten Staaten. Meteor.
 Etschr. 1888, Bd. V, p. 285—'96, 8 Karten. (Zie PM. 1889, p. 19).

het werk van Brendel over het klimaat en den plantengroei van Illinois 1) alsmede de geologische werken van Tyrell, Mc. Connell en Dawson 2 en Stoop's rapport over de petroleum-industrie in N.-Amerika 3), da meer in het bijzonder van technischen aard is.

Over Mexico valt niet veel nieuws mede te deelen; het is den lezers door de mededeeling van Dr. ten Kate⁴), reeds bekend dat de Comission geografica exploradora, onder leiding van Agustin Diaz, bezi is het geheele gebied der republiek geographisch en natuurkundig te of derzoeken. Tot nog toe zijn slechts van eenige onderdeelen van ee paar staten, o. a. van Puebla, de groote, op astronomischen en trige nometrischen grondslag berustende kaarten gereed. De arbeid dier commissie belooft dus van hooge waarde voor de geographische kennis van het uitgestrekte land te zullen worden. Onder de publicaties over Mexic noem ik eene kaart, met beschrijving, der spoorwegen ⁵), de werkt van Blake en Sullivan, Ober en Nordhoff ⁶). Dat van den laat genoemde bevat mededeelingen over het gebergte in het N. van Nede Californie, waar de nieuw opgerichte "International Company of Mexico' de zwavelbeddingen ten W. der Colorado wil exploiteeren en pogingt

¹⁾ Brendel, Flora Peoriana. The Vegetation and the climate of middle Illima Peoria III. 1887. (Refer. van Drude, no. 1508).

²⁾ J. B. Tyrell, Report on a part of Northern Alberta. Geol. and Nat. Hist. Su of Canada. 1887, 176 pp. 2 kaarten 1:506,880 (Refer. van Supan, no. 1458).

R. G. Mc. Connell, The geological structure of a portion of the Rocky Matains. Ibid. 1887, 41 pp. (Als boven, no. 1454).

G. M. Dawson, A geological examination of the Northern Part of Vancous Island and adjacent Coasts. Ibid. 1886, 129 pp. 1 kaart 1:506,800. (Als bown no. 1456).

³⁾ A. Stoop, Rapport over de petroleum-industrie in Noord-Amerika. Jaarb. v. Mijnwezen in Nederlandsch O. Indië 1888, Dl. XVII, p. 5—278, met 26 platen.

⁴⁾ TAG. 1889, M. p. 106.

⁵⁾ Indexed state and railroad map of Mexico. Chicago, Rand, Mc Nally & C°. 18 Pr. 0,50 doll.

⁶⁾ M. E. Blake and M. F. Sullivan, Mexico picturesque, political, progresive. 8°, 228 pp. Boston, Lee & Shepard, 1888. Pr. 6 sh 6 d.

⁽Aankondiging in Ausland 1889, p. 200).

F. A. Ober, Travels in Mexico and Life among the Mexicans. I Yucatan. II C tral and Southern Mexico. III The Border States. IV Mexican resources. 8°, Londo Warne 1888. Pr. 7 sh. 6 d.

Ch. Nordhoff, Peninsular California. 8°, 130 pp., 1 kaart. New-York, Harr. & C°. 1888. Pr. 1 doll. (Refer. v. Supan, n°. 1529).

tot kolonisatie in het werk stellen; ook vindt men er opgaven in over den neerslag en de temperatuur.

In Middel-Amerika wordt onze aandacht getrokken door Miller's ris in het zeer weinig bekende gebied van Oostelijk Yucatan 1), en Goldsworthy's expeditie naar het Coxcomb-gebergte 2) in 1888.

Miller ging van Britsch-Honduras over de Chetumal-baai naar de Hondo-rivier en van daar westelijk naar Bacalar aan de westzijde van de evenzoo geheeten lagune; vervolgens trok hij in noordoostelijke richting tot Santa-Cruz. In het verslag van dien tocht deelt hij bijzonderheden mede aangaande de in die streken wonende Indiaansche bevolking, en wijst hij op verschillende onnauwkeurigheden op de door hem gebruikte kaart van Hubbe en Perez 3).

Het tot dusver nog niet door Europeanen bezochte Coxcomb-gebergte bleek met dichte wouden begroeid en geheel onbewoond te zijn, zoodat de expeditie, onder de leiding van den gouverneur van Britsch-Honduras, Goldsworthy, met vele bezwaren te kampen had; de hoogste top, de Victoria piek, is 1100 m. hoog.

De door dezen tocht verkregen gegevens zijn ook reeds gebruikt bij de vervaardiging der kaart van Britsch-Honduras 4) door Alfr. Usher, op welke kaart ook de ontworpen spoorweglijnen naar Guatemala zijn aangegeven.

Voor den aanleg van het Nicaragua-kanaal schijnt thans een plan te zijn vastgesteld dat in het algemeen overeenkomt met het ontwerp van den ingenieur Menocal 5); slechts hier en daar zijn daarin veranderingen aangebracht, waardoor de lengte van het uit te graven gedeelte van 64,9 km. op 46,5 km. gebracht wordt, maar daarentegen zullen er twee meerbekkens moeten worden gemaakt, nl. het Deseado-meer, tusschen Grey-

¹⁾ A Journey from British Honduras to Santa Cruz, Yucatan. By William Mil-1tr, Assissent Surveyor-General, British Honduras. Met kaartje. Proc. 1889, p. 23.

²⁾ H. E. H. Jerningham, Report of the expedition of the unexplored Coxcomb Mountains in British Honduras. Fol. 31 pp., met kaart, sch. 1:126,720. Belize 1888. PM. '89, p. 152.

Expedition to the Coxcomb Mountains, British Honduras. By J. Bellamy. Proc. '9, p. 542. Met kaart.

³⁾ Mapa de la Peninsula de Yucatan,.... compilado por Joaquin Hübbe y Andreas Azuar Perez y revisado y aumentado con datos importantes por C. Hermann Berendt, 1878. (Proc., p. 28).

⁴⁾ A. Usher, Map of British Honduras. 1:385,000. London, Weller 1888. (Aankendiging in PM. '89, p. 79 en Proc. 1888, p. 812).

⁵⁾ Zie TAG. 1888, M. p. 56; PM. '89, p. 56 en Science XII, p. 158.

town en het Nicaragua-meer, en het Tola-meer, tusschen het laatstgenoemde en de haven Brito aan den Grooten-Oceaan.

Over het Panama-kanaal verschenen eenige tijdschriftartikelen en een werkje van Kohl, waarvan de titels hier in de noot worden opgegeven 1).

Onder de werken over Centraal-Amerika vermeld ik verder dat van Peralta over het grondbezit in Costa-Rica²), waarin de verschillende Indianen-stammen, welke het land tijdens de verovering door de Spanjaarden, alsmede het bij hen toenmaals bestaande grondbezit worden beschreven, terwijl ook de zeer gunstige tegenwoordige toestand des lands met zijn vruchtbaren bodem en zijne werkzame bevolking wordt geroemd.

Pennesi geeft, in eene vrij uitvoerige verhandeling, eene beschrijving der vulkanen en aardbevingen in Centraal-Amerika³), Polakowsky eindelijk doet eenige mededeelingen over de tot 1888 in Costarica gedane klimatologische waarnemingen⁴), naar aanleiding van een overzicht daarvan door Dr. H. Pittier samengesteld en gepubliceerd in het door hem geredigeerde tijdschrift, Boletin Trimestral del Instituto Meteorológico Nacional."

De litteratuur over de West-Indische eilanden vinde hier mede eene plaats. Met voorbijgang van tijdschriftartikelen, die men in de bibliographie van ons tijdschrift en in het Litt.-Ber. van PM. (n°. 1549—1564) kan vinden, ontleen ik aan het laatstgenoemde de opgave der werken van Graham en Sawyer over de scheepvaart in de Caribische

¹⁾ A. de Gogorza, The problem of interoceanic communication through the American Isthmus. Bull. Amer. Geogr. Soc. 1888, XX, p. 502.

Ch. H. Stockton, Commercial geography of the American Interoceanic canal. Ibid. p. 75.

F. de Lesseps, Le Canal de Panama au point de vue géographique, maritime et commercial. Proc. 1888, p. 665.

A. Duponchel, Le caral de Panama et les torrents artificiels. Economiste francais 1889, p. 45-47.

E. Kohl, Grosse Verkehrsbauten und der Panama-Kanal. 8°, 46 pp. Leipzig, Felix, 1888.

²⁾ José F. de Peralta, La propriété foncière à Costa-Rica, 12°, 80 pp. Bruxelles, Ad. Mertens, 1888. (Ref. v. Polakowsky, PML. '89, 'n°. 1548).

³⁾ G. Pennesi, Vulcani e terremoti nelle regione istmica dell' America Centrale. Bull. Soc. geogr. ital. 1888, p. 923 vlg. (Refer. van Günther. PML. '89, nº. 1540).

⁴⁾ H. Polakowsky, Die in Costarica bis 1888 gemachten klimatologischen Beobachtungen. PM. '89, p. 24.

læ en de Golf van Mexico 1), de beschrijving der Bermuda-eilanden dor Stark 2), waarvan de titel doet vermoeden dat men hier niet zoomet een wetenschappelijken arbeid als wel met een gids in den trant in Baedeker's bekende werken te doen heeft. Verder de werken over Ham en St. Domingo van La Selve en Léal 3) en over Trinidad en Jamaica van Collens, Sinclair en Fyfe 4).

Onder de reizen in Zuid-Amerika verdienen vermelding die van Coudreau en Brousseau in Guyana, Ehrenreich en Labre in bet Amazonasgebied, Stradelli op den Orinoco, en Hettner in de Andes van Peru en Bolivia.

Coudreau 5) heeft, in opdracht der Fransche regeering, een tocht naar ist brongebied der Oyapock-rivier gedaan en die rivier, evenals de Maroni en de Maroeini, geheel opgenomen. Daarna bezocht hij het Tumac-Humac-gebergte, waar honderd en vijftig toppen naar ligging en hoogte werden bepaald, en bijna alle bronnen der naar beide zijden stroomende rivieren opgenomen. Op deze reis, die van Mei 1887 tot April 1889 duurde, en die zich uitgestrekt heeft over vier duizend kilometers, voor en groot deel langs Indianen-paden in oerwoud en soms ook dwars door het woud, zoodat de weg met het kapmes gebaand moest worden, word Coudreau onmetelijke rijkdommen aan cacao en caoutchouc, welke naar zijne meening geëxploiteerd zouden kunnen worden. Hij bezocht en twintigtal Indianenstammen, waarvan de meeste zich met landbouw bezighouden en zich onderscheiden door werkzaamheid en schranderheid;

¹⁾ S. L. Graham and F. E. Sawyer, The Navigation of the Carribean Sea and Gulf of Mexico. I The West India Islands and Bermuda Islands. U. S. Hydrogr. Office, n°. 86, Gr. 8°, 860 pp. Washington 1888.

¹⁾ J. H. Stark, Bermuda Guide: a description of everything on or about the Ber
ds Islands. 12°, 157 pp. Boston, Cupples & Hurd. 1888. Pr. 2 doll.

⁸⁾ E. La Selve, La république d'Haïti, ancienne partie française de Saint-Domingue. 8°, 136 pp. Limoges, Ardant. 1889.

F. A. Léal, La république Dominicaine. 8°, 79 pp. Paris, Impr. L. Beillet 1888.

⁴⁾ J. H. Collens, A guide to Trinidad. 8°, 287 pp. London, Stock 1888. Pr. 5 th. (Aankondiging in Sc. G. Mag. 1889, p. 224).

A. C. Sinclair and L. R. Fyfe, The Handbook of Jamaica for 1888—'89, 5. 568 pp. London, E. Stanford, 1888. Pr. 8 sh

⁵⁾ Zie over zijne vroegere reizen en werken TAG. 1888, M. p. 104 en 458; 1889, M. p. 369 en 370; alsmede: H. A. Coudreau, Voyage au Rio Branco, aux montenas de la Lune, au Haut Trombetta. Bull. Soc. Norm. de géogr. 1887, p. 189, 261 a 325 vlg. (Besproken door E. T. Hamy in Bull. de géogr. hist. et descript. 1888, p. 119).

ook bracht hij eene belangrijke verzameling ethnographische voorwerpen mede 1).

In 1888 werd het gebied aan de boven Maroni geologisch onderzocht door G. Brousseau, maar de resultaten zijner opneming en zijne verzamelingen en aanteekeningen zijn, door een brand te Cayenne, verloren gegaan, zoodat hij genoodzaakt geweest is naar het tooneel zijner werkzaamheid terug te keeren, ten einde zijne onderzoekingen opnieuw te doen 2). De resultaten van Ehrenreich's expeditie in het bovenstroomgebied der Amazonasrivier worden te gemoet gezien, daar hij in Juli van het vorige jaar naar Berlijn is teruggekeerd 3).

De reis van kolonel Labre in 1887 naar het gebied der Beni- en der Purus-rivier is in een vroegeren jaargang van ons tijdschrift, door mij vermeld geworden ⁴). Men vindt daaromtrent thans een verslag in de Proc. ⁵) met eene door Turner daarbij gevoegde kaart.

Het doel dier reis was de verkenning van het terrein met het oog op de mogelijkheid om een gewonen weg of een spoorweg aan te leggen, die korter en minder kostbaar zou zijn dan die welke onmiddellijk langs de Madeira, van af San Antonio tot Guajara-merim aan de Mamoré, was ontworpen ten behoeve van het goederenvervoer. De streken langs de Beni, de Madre de Dios en de Purus-rivier 6', bevatten groote rijkdommen aan gomelastiek, cacao enz., maar de watervallen der Madeira, tusschen de zooeven genoemde plaatsen, vormen een onoverkomelijk bezwaar voor de scheepvaart; Labre had, toen hij in 1887 met eenige Boliviaansche handelaars in vier kano's en twee lichte booten (montarias), van San Antonio naar Villa Bella, aan den mond der Beni-rivier, trok, 34

¹⁾ CR. '89, p. 258 vlg. (niet p. 64, zooals in PM. '89, p. 255 staat). Zie ook: Le Counani et le Mapa par Henri Coudreau. Bull. 1889, p. 396. Met kaart van de Mapa en de beneden Araguary. Sch. 1:550,000. De genoemde rivieren liggen ten N. van de monding der Amazonas.

²⁾ PM. '89, p. 80.

³⁾ Ibid. p. 255.

⁴⁾ TAG. 1888, M. p. 460.

⁵⁾ Colonel Labre's Explorations in the Region between the Beni and Madre de Dios Rivers and the Purus. Proc. '89, p. 496. Met kaart op de schaal van 1:3,000,000, door W. J. Turner.

Zie ook: A. R. P. Labre, Exploração do Rio Itury. Revist. Soc. Geogr. Rio de Janeiro 1888, IV, p. 117.

⁶⁾ De Purus en zijne zijrivieren zijn het eerst bereisd geworden door W. Chandless in 1865 en de bewoners dier streek hebben thans de groote lgaripe, die op 10° 30′ Z.B. en 71° 30′ W.L. links in de Purus valt, ter eere van dien ontdekkingsreiziger Rio Chandless genoemd. PM. '89, p. 80.

dæn noodig om den afstand van 161 E. mijlen tusschen die plaatsen af te leggen. Men moest negen watervallen en stroomversnellingen voorbijtekken en dan telkens de goederen uit de booten nemen en deze laatste op houten rollen over land verder brengen. Labre stelt nu voor en weg of nog liever een spoorweg aan te leggen, ter lengte van 93 E mijlen (150 km.) tusschen de Madre de Dios, eene linkerzijrivier der Beni en de Aquiry, eene rechterzijrivier der Purus, nl. van Amapo aan de eerstgenoemde tot Flor do Ouro aan de laatste rivier. Ook stelt hij roor een verbindingsweg aan te leggen van af den mond der Ituxymier in de Purus, oostelijk van de eerste naar Correnteza aan de Beni en verder naar Guajara-mirim aan de Mamoré 1). Hij gelooft dat in het stroomgebied der Purus omstreeks 40,000 Indianen wonen, die veertig of meer verschillende talen spreken (!).

De opnemingen door den ingenieur. A. Wertheman, in 1877 en 1882 gedaan in het Peruaansche "Departamento de Amazonas", zijn thans in den vorm eener kaart gepubliceerd 2), daar de erbij behoorende beschrijving, die indertijd door Wertheman aan het Berlijnsch aardrijkskundig genootschap was toegezegd, niet is aangekomen. Zoo zal men langzamerhand vertrouwbare kaarten van verschillende gedeelten van het boven-Amazonasgebied verkrijgen, waaraan, zoowel uit een wetenschappelijk als uit een praktisch oogpunt, groote behoefte bestaat.

Van gewicht is de reis van Hettner, in opdracht van het Pruisische ministerie van onderwijs, in zuidelijk Peru en noordwestelijk Bolivia, sedert 1888. Van uit Arequipa onderzocht hij het zuidelijk kustgebied en vervolgens ging hij over Urbinas naar Puno aan het Titicacameer en naar La Paz. Zijne voorloopige mededeelingen in de Verh. der Ges. f. Erdk. zu Berlin 1888 n° 11, en 1889, n° 3 en 6, bevatten vele geologische, physisch-gegraphische en ethnographische bijzonderheden 3). Tot de onderzoekingen in het noordelijk gedeelte van Z.-Amerika be-

²⁾ In (den 2den druk van) Sydow-Wagner's Methodischer Schulatlas vindt men op kaart n°. 44 eene uitmuntende voorstelling van het in den tekst bedoelde gebied, nl. van de rivieren Purus, Aquiry, Madre de Dios, Beni, Mamoré enz.; de kleinere (o.a. de Ituxy) zijn weggelaten, evenals de namen der plaatsen aan de eerstgenoemde rivieren. Die voorstelling beantwoordt overigens geheel aan die van Turner's kaart.

³⁾ Bemerkungen zu A. Wertheman's Karte eines Teiles des peruanischen Departamento & Amazonas. ZGEB. 1889, p. 81. De kaart is vervaardigd op de schaal van 1:600,000 to berat het gebied tusschen 7°—5° 20′ Z. B. en 77°—78° 35′ W. L. v. G.

⁴⁾ PM. '89, p. 255. Zie ook over Hettner, TAG. 1885, M. p. 650; 1887, M. p. 444 en 1888, M. p. 459.

hooren ook die van graaf E. Stradelli in het Orinoco-gebied '); zijn oorspronkelijk plan om de bronnen dier rivier op te nemen heeft hil niet gevolgd, maar hij is haar opgevaren tot San Fernando de Atabapo, de hoofdplaats van het territorium Alto Orinoco en daarna langs de Atabapo getrokken tot Yavita. Ook heeft hij opnemingen gedaan langs de Rio Negro, de Rio Branco en de Vichada-rivier (1887---'88).

In Argentina hebben wij de reizen van Calvimonte en Arana in het noordelijke deel van de Gran Chaco, n. l. van Bolivia naar de Paraguay 2), en van I) e Brettes in hetzelfde gebied, wiens getuigenis evenwel in Pet. Mitt. eenigszins wantrouwend wordt besproken 3), gedeeltelijk omdat De Brettes niet zegt op welke wijze hij zijne breedte en lengte-waarnemingen gedaan heeft 4) en ten deele omdat hij geene getuigen heeft ter bevestiging van het verhaal zijner talrijke avonturen. Zijn geleide bestond aanvankelijk uit 50 Indianen en een bewoner van Paraguay, den peon Ayala, die hem echter al spoedig in den steek lieten. Die avonturen, hoofdzakelijk bestaande in eenige moeielijkheden met de Indianen, schijnen mij echter niet zoo ongeloofelijk toe; mijn

¹⁾ Zie TAG. 1888, M. p. 104; PM. '89, p. 152; Boll. Soc. Geogr. It. 1888, p. 715 en 832. E. Stradelli, Note di viaggio nell' Alto Orenoco. Met kaart van den benedenloop der Vichada, sch. 1:1,000,000. — Id., Dal Cucuhy a Manada. Ibid. 1889, p. 6—27; Rio Branco. Ibid. p. 210—228 en 251—267.

²⁾ PM. '89, p. 255. Zij hebben den tocht gedaan dien Thouar had willen maken, maar waarin deze niet geslaagd is. Zie A. Thouar, Le problème Chaco-Pilcomayo. Rev. de géogr. 1888, XXIII, p. 241—246. — Voyage dans le Delta du Pilcomayo. Tour du Monde, 1889, LVII, p. 145—208.

⁸⁾ Vicomte J. de Brettes, *Ma mission au Chaco*. Rev. Géogr. 1889, XXIV, p. 442 en XXV, p. 52. Zie PM. '89, p. 256.

⁴⁾ Op het kaartje, dat bij het opstel behoort, staat alleen: "cette carte a été dressée d'après les observations astronomiques et les relevés de route de l'explorateur." Men wil echter in zulke gevallen gaarne weten welke instrumenten daarbij gebruikt zijn en hoe die zijn gebezigd, alsmede welken graad van nauwkeurigheid de opnemer zelf aan zijn werk toekent. De reis duurde van 13 Oct. '87 tot in het begin van Nov.; het verste punt dat de Brettes bereikte was op 21° 55′ Z. B. en 63° 41′ W. L. v. P. In PM. ''9, p. 255 staat dat hij op 30 Oct. op 68° 56′ 80″ O. L. v. Gr. kwam, maar dat is blijkbaar eene vergissing; de Brettes vermeldt dat hij op 30 Oct. op 21°46′ 15″ Z.B. en 68° 56′ 80″ W.L. (long O.) was en dat komt ook uit met zijne kaart waarop de meridaan van Parijs als eerste is aangegeven; maar eenige dagen later — den juisten datum noemt hij niet — bereikte hij het hier boven opgegeven punt dat westelijk van het kampement Aguada (30 Oct.) is geteekend; dit laatste ligt echter niet op 63° 56′ 80″ W. L. v. P., maar ten O. van 68° dus waarschijnlijk op 62° 56′ 80″. Er is dus bij de Brettes eveneens eene vergissing in de opgave.

hoofdbezwaar tegen De Brettes mededeelingen is gelegen in de omstanögbeid dat zijn verhaal grootendeels daarover loopt (alsmede over zijn pard en zijn hond Biskra), terwijl het overigens weinig zaakrijk en weiing precies is. Men vergelijke daarmede eens de mededeelingen van lage over zijne reizen en opnemingen in het zuidelijk gedeelte van de Chaco, waar de Argentijnsche regeering in de laatste jaren ondermetingen en opnemingen laat doen met het oog op de ontsluiting van det gebied voor de blanken, die zich daar als kolonisten zouden kunnen neerzetten 1). Na een algemeen overzicht van de gesteldheid dier steken en der voornaamste rivieren geeft de schrijver eene beknopte thets van de belangrijkste expedities die langs de Pilcomayo hebben plants gehad (Ayolas 1537, Patiño 1721, Castanares 1741, Magariños 1843, Van Nivel 1844, wiens overdreven verhalen door de Moussy zonda kritiek werden overgenomen, Crevaux 1882, Thouar 1885-'86) alsmede van de tochten langs de Bermejo (o. a. dien van kapitein Page, den vader van den schrijver, die tusschen de jaren 1853 en 1858 groote opnemingen deed in het stroomgebied van de Rio de la Plata, en de espeditie in 1871 uitgezonden door de Stoomvaartmaatschappij te Buenos Ayres). Vervolgens deelt hij de uitkomsten van zijne eigene onderzoekingen mede; de Bermejo heeft zeer sterk aswisselende waterstanden, hetgeen voor de scheepvaart zeer groote bezwaren oplevert, daar het land in sommige tijden des jaars wijd en zijd overstroomd wordt en men dan niet kan zien waar eigenlijk de rivier is. Het zuidelijk gedeelte van de Chaco bevat uitgestrekte wouden, heeft op vele plaatsen een michtbaren bodem en over het geheel een gunstig klimaat. Men zou er katoen, tabak, olijven, sorghum, gierst, rijst, manioc enz. kunnen verbouwen. Voor veeteelt is het land mede zeer geschikt, zoodat gerust mag gezegd worden dat het eene toekomst heeft.

Ten slotte zij nog gewezen op de onderzoekingen van Fontana en Del Castillo in Patagonië. Eerstgenoemde heeft, op zijne laatste reis in 1887—'88 in Noordelijk Patagonië, de vraag hoe de rivieren die in Patagonie ontspringen en vervolgens door de Andes breken om in den Groten Oceaan uit te loopen, eigenlijk stroomen, niet kunnen oplossen, hoewel hij op verscheidene punten tot de vermoedelijke grens van Chile is doorgedrongen 2). Del Castillo heeft van 1888 op 1889 over-

¹⁾ The Gran Chaco and its Rivers. By Captain John Page, Argentine Navy. Proc. '89, p. 129. Met kaartje p. 130.

²⁾ PM. '89, p. 80. Bol. Inst. Geogr. Arg. 1888, IX, p. 309. L. J. Fontana, Exploración de la Patagonia. Zie ook: Revue française 1889, IX, p. 164-66.

winterd bij de groote meren in zuidelijk Patagonië, nl. aan den voel van den Monte Frias ten Z. W. van het Lago Argentino, maar hij is ir Februari 1889, kort na zijn terugkeer in Buenos Aires, gestorven, vóór dat hij meer omstandige mededeelingen over die reis heeft kunner doen 1).

Wenden wij ons thans tot de publicaties over Zuid-Amerika, dan ver dient in de eerste plaats onze aandacht eene beknopte mededeeling van Trognitz over zijne berekening van de oppervlakte der staten van Zuid-Amerika, op grond der kaarten 90—95 in Stieler's Handatlas²).

Het totaal der oppervlakte van alle staten, zooals dit wordt opgege ven in Behm en Wagner's Bevölkerung der Erde, VII, p. 85 (Erg. Het zu Pet. Mitt. no. 62) heeft hij behouden, maar hij heeft de opgaven zooals zij door de staten zelven gedaan worden, verbeterd door in aan merking te nemen dat sommige dier staten aanspraak maken op dezelfd landstreken, zoodat men ze bij optelling tweemaal verkrijgt. Hij kom aldus tot de volgende getallen:

Brazilië	8,361,350 qkn	a. Peru	1,137,000	qkm.
Fransch Guyana	78,900 ,,	Bolivia	1,334,200	17
Nederlandsch Guyana	129,100 ,	Chile	776,000	"
Britsch Guyana	229,600 .,	Argentina	2,789,400	,,
Venezuela	1,043,900 ,,	Uruguay	178,700	"
Columbia	1,203,100 ,,	Paraguay	253,100	"
Ecuador	299,600 ,,	Totaal	17,813,950	qkm.

Het grootste verschil met de vroegere opgaven vertoont Ecuador, voo welks oppervlakte men in bovengenoemd Erg. Heft no 62, 643,295 qkn vindt, d. i. een verschil van 343,695 qkm.! Dat hier niet aan een drukfou gedacht kan worden blijkt wanneer men de getallen optelt, in welk ge val de uitkomst met het aangegeven totaal overeenstemt. Ook bij Co lumbia is het verschil belangrijk nl. 372,430 qkm. (volgens Behm er Wagner is de oppervlakte 830,670 qkm.); het is op zich zelf groote dan bij Ecuador, maar in verhouding tot de oppervlakte des lands kleiner Er blijkt genoegzaam dat men zich bij getallenopgaven aangaande lan den, waarvan de grenzen nog zoo weinig vaststaan, niet te angstvallig aan een bepaald cijfer moet vasthouden. Volkomen zekerheid zal eers dan verkregen zijn wanneer van alle staten van Zuid-Amerika kaarter

¹⁾ PM. '89, p. 127. Revue française 1889, p. 441.

²⁾ Flächenberechnung der Staaten Südamerikas. Von B. Trognitz, PM. '89, p. 96

mllen zijn vervaardigd 1) gelijk men ze van de Europeesche staten heeft, en wanneer de grenzen overal behoorlijk zullen zijn vastgesteld; twee roorwaarden die vooreerst nog wel niet vervuld zullen worden.

Verder zij de aandacht gevestigd op eenige mededeelingen aangaande untworpen spoorwegverbindingen in Middel- en Zuid-Amerika 2). Volgens de "Zeitschrift des Vereins Deutscher Eisenbahn-Verwaltungen", was men in Mexico voornemens in 1889 te beginnen met den aanleg van twee spoorweglijnen, welke de beide kusten met elkander zouden verbinden; de zuidelijke lijn begint bij de hoofdstad, in aansluiting dus aan de reeds bestaande lijn naar Veracruz, en gaat over Puebla en Osjaca naar de golf van Tehuantepec, waar eene tweede lijn zal uitloopen, ter lengte van 300 km. welke, eveneens van den Atlantischen Oceaan komende, de landengte zal doorsnijden. De noordelijke lijn gaat van Veracruz naar Acapulco (785 km.); het gedeelte Puebla—Virlyes (81 km.) is reeds voltooid.

In Brazilie is eene lijn ontworpen van Pernambuco langs de San Francisco en hare zijrivier de Abaete, over de Serra da Matta da Corde naar de Paraná, vervolgens langs deze rivier en naar de Urugay, voorbij de steden Borja en Uruguyana en eindelijk in westelijke richting over Mendoza naar Valparaiso. De totale lengte wordt geschat op 6800 k.M. Ook zijn er nog plannen om Argentina te verbinden met Bogotá, door eene lijn die over de hooglanden van Bolivia, Peru, Ecuador en Columbia zou loopen 3). Alnaarmate van het plan dat tot uitvoering komt, zou de lengte van de nog aan te leggen lijnen als volgt zijn: 1. Buenos Ayres—Jujuy—La Paz—Bogotá, 3330 km. 2. Buenos A.—Asuncion—Sucre—La Paz—Bogotá, 4050 km. 3. B. A.—Asuncion—Salinas—Sucre, enz. 5190 km. 4. B. A.—Corrientes—La Paz, enz. 4226 km. 5. B. A.—Mendoza—San Felipe—Coquimbo—Lima—Bogotá, 3410 k.M. Deze

¹⁾ Zoo was bijv., volgens Lange, tot dusverre de kust van de Braziliaansche provincie Santa Catharina ook op de beste zeekaarten weinig nauwkeurig voorgesteld; ten gevolge van zijne bemoeiingen heeft er thans eene nauwkeurige opneming plaats gehad. Zie Die Küste des Atlantischen Ozeans von der Barre do Araquary bis zum Rio Tijucas. Von Prof. Dr. Henry Lange. PM. '89, p. 171.

²⁾ Neue Ueberlandbahnen in Mittel- und Südamerika. Von Prof. Dr. A. Supan, PM. 199, p. 150.

³⁾ Over den aanleg van spoorwegen in Bolivia, zie men ook: A. Quijarro, Construction de ferrocarriles y establicimiento de colonias agricolas en la rejion oriental. 8°, 140 pp. met kaart. Buenos Aires, Peuser, 1888. (Ref. van Polakowsky n°. 1674. PML 1889).

laatste lijn zou voor een groot deel langs de kust gaan (Coquimbo-Lima).

In het Litt. Ber. van PM. 1889 zijn de werken en tijdschriftartikelen over Z.-Amerika te vinden, onder n° 1565—1681. Daar de laatstbedoelde ook onder de bibliographie in ons tijdschrift voorkomen, vermeld ik alleen de voornaamste op zich zelf staande werken.

Onder de kaartwerken mogen genoemd worden die van het gebergt van Venezuela door Sievers¹), Raimondi's kaart van een gedeelt te van Peru²), de reeds boven genoemde van Wertheman, de kaarte en de atlas van Argentina door Duclout en Beyer³), de kaart van Paraguay door Criado⁴), alsmede de kustopnemingen in verschillend gedeelten van het werelddeel, door de "Service hydrographique de la marine".

Werken over Guyana zijn die van Hue, Maurel en Coudreau alsmede een artikel van Mayer over de rechten van Frankrijk op he gebied dat tusschen de Tapahoni en de Awa ligt ⁶) en waarover, gelijden lezer bekend is, een geschil is ontstaan tusschen de Nederlandschen de Fransche regeering. De vraag komt nl. hierop neer, welke de beide genoemde rivieren als de bronrivier of den bovenloop der Marwijne (Maroni) beschouwd moet worden, want de laatstgenoemde vormt volgens een vroeger verdrag, de grens tusschen het gebied der beid

¹⁾ W. Sievers, Geognostische Karte der Venezolanischen Kordillere. 1:1,000,00 Hamburg, Friederichsen & C°. 1888, Pr. 4 M.

²⁾ A. Raimondi, Mapa del Peru. Provincias de Carabaya y Sandia del depetamento de Puno. 1:260,000. Paris, Rousseau. 1888. (Ref. van Wichmann, nº. 1854)

³⁾ J. Duclout. Mapa de la República Argentina y de los paises contigues 1:4,000,000. Buenos Aires, Nolte, 1888. (Ref. v. Wichmann, nº. 1576).

Idem, Mapa general de la Pampa Central. 4 Bl. 1:600,000. Buenos Aires, Nolt 1887. (Ref. v. Wichmann, no. 1578).

C. Beyer, Atlas general de la República Argentina. Fol. 31 kaarten en 6 pp. Index. 3de Uitg. Buenos Aires, Estrada & Cia 1888. (Ref. van Supan, n°. 1577).

⁴⁾ M. A. Criado, La república del Paraguay. 1:1,500,000, Asuncion, Godel 1988. (Ref. v. Wichmann, no. 1575).

⁵⁾ F. Hue, La Guyane française. 8°, 239 pp. Paris, Lecène et Oudin. 1888.

E. Maurel, Histoire de la Guyane française. 8°, avec 2 cartes. Paris, Challamel, 1888, fr. 8.

H. Coudreau, La Haute Guyane. Rev. de Géogr. 1888, XXIII, p. 247-270 (Ref. van Camena d'Almeida, n°. 1590).

⁶⁾ E. Mayer, Droits de la France sur le territoire compris entre le Tapanahon et l'Aoua. La Géographie 1888, n°. 5.

staten. De omstandigheid dat in het betwiste gebied goud is ontdekt, gest aan het geschil zijne beteekenis en is dan ook de aanleiding tot het ontstaan ervan geweest 1).

Over den toestand van Columbia verscheen een rapport van Whe eeler³), dat vele belangrijke gegevens omtrent den landbouw aldaar bem. Deze heeft plaats tot eene hoogte van 3700 m.; slechts 3 millioen bet. zijn ten behoeve van den landbouw in gebruik. De llano's in het 0. en de woudgebieden aan de kust van den Grooten Oceaan worden niet bebouwd. Koffie en tabak zijn de hoofdproducten voor den mitoer; verder heeft men cacao, mais, suikerriet, bananen, katoen enz en, in de hoogere gedeelten des lands, aardappelen, tarwe, gerst, boonen.

Het handboek van Le mos over de geographie van Columbia bevat, Mikens het referaat 3), naast veel goeds, o. a. de opgaven betreffende is administratieve indeeling van het land, ook vele overdrevene en onjuiste voorstellingen.

Over Bolivia hebben wij de werken van Armentia, Oropeza⁴) na het reeds vroeger genoemde van Quijarro over den aanleg van poorwegen in dat land.

De belangrijke arbeid van Armentia vormt het eerste deel eener, aan de geographie en de geschiedenis gewijde "Biblioteca Boliviana". Bolivia, zen van de rijkste landen der aarde, bevat, vooral in het nog weinig bekende noordoostelijke gedeelte des lands, groote schatten in de wouden der laagvlakte; nog onlangs werden, door baron A. de la Riviere, zeer like goudbeddingen ontdekt in het zand der Rio Tipuani, eene zijrier der Mapiri, welke in de Beni uitloopt. Pater Armentia heeft de Rio Madre de Dios in hare geheele lengte bevaren en vier jaren onder daar wonende Indianen verkeerd.

Het werk van Oropeza heeft betrekking op de vaststelling der grenzen

^{1;} Zie ook TAG. 1886, M. p. 898.

^{*} Wheeler, The agricultural condition of Columbia. Dipl. and consular Reports. Leaden, Foreign office. n°. 446, 8°, 18 pp. (Uitgebreid refer. van Supan, n°. 1658).

A. M. D. Lemos, Compendio de Geografia de la República de Colombia. 8°,
 I. 164 pp. Medellin 1887. (Ref. van Polakowsky, n°. 1657).

⁴⁾ Padre Nicol. Armentia, Navegacion del Madre de Dios. La Paz. Impr. La Paz." 1887. (Ref. van Polakowsky, n°. 1669). Zie over Armentia's reis, TAG. 189, M. p. 379.

¹ Oropeza, Cuestion de limites entre las Repúblicas de Bolivia y del Perú. 8°, ¹ Iss pp. Sucre. 1888. (Bef. v. Polakowsky, n°. 1678).

van Bolivia met de omliggende landen, waaromtrent altijd nog ve onzekerheid en verschil van meening bestaat.

Behalve het artikel van Polakowsky over de kolonisatie en c kartographie van Chile¹), vermeld ik het werk van Wiener over Chi en de Chilenen²) en dat over Moraleda i Montero's reizen de jaren 1786—88 van Callao naar San Carlos op Chiloë, waarbij eer beschrijving gevoegd is van de eilanden, kusten, enz. in de nabijhe van dat eiland³).

Kan men over het algemeen zeggen dat de landen der Nieuwe Were meer en meer de aandacht der Europeesche natiën tot zich beginne te trekken, naarmate hunne beteekenis voor de emigratie en voor h wereldverkeer toeneemt, in het bijzonder is dat van toepassing op A gentina en Brazilië. Door hunne, in vergelijking met de Europeescl staten (behalve Rusland), geweldige uitgestrektheid; de pogingen hunn regeeringen om de onmetelijke hulpbronnen dier landen tot ontwikkelij te brengen; de beteekenis welke de Braziliaansche koffie reeds sin lang op de wereldmarkt heeft en welke het graan van Argentina me en meer begint te verkrijgen, verdienen die landen zeer zeker de aa dacht welke er aan geschonken wordt. Aan de lezers van ons tijdschri behoef ik niet in herinnering te brengen het belangrijke artikel van V F. Andriessen, dat vooral geschreven is met het oog op de bete kenis van Argentina voor den handel en de emigratie 4) en waarin, b halve vele gegevens daaromtrent, ook verschillende oudere en nieuwe werken over Argentina worden besproken, met name ook de berichte van den Hollandschen consul te Buenos Ayres. Ook op het werk va E. Daireaux⁵) werd in ons tijdschrift de aandacht gevestigd. Tha noem ik de werken van Bavio, Van Bruyssel, Borsari, La

¹⁾ Globus 1889, LV, no. 18-& 19.

²⁾ Ch. Wiener, Chili et Chiliens. 7mc éd. Gr. 8°, 884 pp. Paris Léop. Cerf. 189 (Ref. v. Polakowsky, n°. 1676).

⁸⁾ J. de Moraleda i Montero, Esploraciones jeográficas é hidrográficas. Cuna introd. por D. Diego Barros Arana, Gr. 8°, 538 pp. Santiago 1888. (Euv. Polakowsky, n°. 1677).

⁴⁾ De Argentijnsche republiek, hare beteekenis voor emigratie en handel, door \(\) F. Andriessen. TAG. 1889, M. p. 225-380.

⁵⁾ E. Daireaux, La vie et les moeurs à la Plata. 2 vol. gr. 8°, Paris, Hachet 1888. Met kaarten. (Besproken in de Rev. géogr. 1888, XXIII, p. 307.) Zie TA(1889, p. 631.

zina en Avé-Lalle mant 1). In het werk van V. Bruyssel wordt een orancht gegeven van den rijkdom des lands en van de daar heerschende tostanden, vooral met het oog op de immigratie, de verschillende culters in de gekoloniseerde gedeelten des lands, de estancia's en de veeteelt, aan welke onderwerpen afzonderlijke hoofdstukken gewijd zijn. Het sek bevat eene menigte nieuwe statistische opgaven over de verschilkade koloniën, en mededeelingen over hunne ontwikkeling en hun teanvoordigen toestand. Borsari's arbeid is van historischen aard. Van tel belang voor de kennis des lands is het handboek van Latzina, warbij kaarten gevoegd zijn van de republiek in haar geheel, van de Maten Buenos Aires, Santa Fé, Entre Rios, Cordoba en Tucuman, een platte grond van de stad Buenos Aires en eene afzonderlijke kaart van de spoorwegen, postkantoren en telegraaflijnen der republiek. Het werk kvat hoofdstukken over de physische gesteldheid en de staatkundige rganisatie des lands, nauwkeurige en uitvoerige beschrijvingen der verchillende provinciën en eene groote hoeveelheid statistische mededeeingen van allerlei aard 2).

¹⁾ E. Bavio, Geografia de la República Argentina. 8°, 424 pp. Buenos Aires,

E van Bruyssel, La République Argentine. 8°, 272 pp. Bruxelles, Th Falk.

Ferd. Borsari, Una página di Storia Argentina. 8°, 32 pp. Napoli 1888. (Als brea, nº. 1639b).

F. Latzina, Geografia de la República Argentina. 8°, 758 pp. 4 kaarten, Buenos ires, F. Lajouane, 1888. (Als boven, n°. 1640).

G. Avé-Lallemant, Memoria descriptiva de la Provincia de San Luis. Gr. 8°, Bs pp. San Luis 1888. (Als boven, n°. 1641).

¹⁾ Ik moet er nogmaals uitdrukkelijk op wijzen dat ik verreweg de meeste mededeengen over de door mij opgegevene werken ontleend heb aan het Litt. Ber. in PM., war de referaten in den regel veel uitvoeriger zijn dan de mededeelingen in mijn overlicht. Mijne bedoeling kan geene andere zijn dan het samenstellen van een beknopten bidraad ten behoeve van de lezers die niet in de gelegenheid zijn de verschillende bischriften telkens na te gaan, wanneer zij over den toestand onzer kennis van een diets willen weten. Ik heb mij er op toegelegd om den lezer het vinden van den in de zeer verspreide litteratuur zoo gemakkelijk mogelijk te maken, door zoo uitwig en nauwkeurig mogelijke verwijzingen naar de te raadplegen werken en tijdschriften. Ieder zal gemakkelijk inzien dat het samenstellen van een zelfstandig bewerkt, hisch overzicht der geographische litteratuur van alle landen der aarde, van één permiet gevergd zou kunnen worden, zelfs al had hij het geheele jaar niets anders te ten. Men vergelijke het in de inleiding medegedeelde aangaande het Litt. Ber., dat veer vele personen bewerkt wordt.

De beschrijving der provincie San Luis door Avé-Lallemant dateer reeds van 1882, maar aangezien dat gebied niet tot de bevoorrecht streken des lands behoort, wat betreft zijne vruchtbaarheid, zijn klimaat zijne veeteelt en zijn handel, en zulks ook door den schrijver onom wonden wordt medegedeeld, is de uitgave van het werk vertraagd, daa de Argentijnsche regeering er beslag op had gelegd en de schrijver he eerst na veel moeite en lang wachten heeft teruggekregen. Hij had he manuscript bij het bestuur ingediend ingevolge eene door de regeering zelve indertijd (1882) gedane oproeping om de verschillende provincie des lands te beschrijven, waarbij prijzen in het vooruitzicht waren ge steld.

Alvorens de werken over Brazilië op te geven wensch ik nog even d aandacht te vestigen op het werk van De Bourgade over het no zoo weinig bekende Paraguay¹) en op de statistische verslagen betref fende Urugay²).

Thans nog enkele woorden over Brazilië, dat, gelijk men weet, in 1889 eene republiek is geworden. Vooreerst hebben wij hier te vermelden het onderhoudend geschreven werk van onzen landgenoot M. L. Van Deventer³), dat vele bijzonderheden bevat over het huiselijk en het maatschappelijk leven der bevolking, alsmede gegevens over de productie en den uitvoer van koffie, de bank van Brazilië en de spoorwegen De beschrijving der schoone natuur in de omstreken van Rio de Janeiss is goed geslaagd, zoo ook die van het leven op de groote koffieplantaget Dan hebben wij de werken van Schanz, Morel en Perrod⁴)

¹⁾ Le Paraguay, par le Dr. E. de Bourgade la Dardye. — Ouvrage renfermant vingt-six gravures hors texte et une grande carte du Paraguay (1:1,000,000) gravée d'après les travaux personels de l'auteur, 460 pp. Paris, Plon. 1889.

Zie over De Bourgade's reizen in Paraguay, TAG. 1888, M. p. 461.

²⁾ The Republic of Urugay. The country in 1888. Statistical data. With map. Low don, Consulate 1888. — Prospects of 1889. A memorable Year. Ibid. 1889.

⁸⁾ M. L. van Deventer, Brazilië, Land en Volk geschetst. Met een aankangst over den oeconomischen en finantiëelen toestand van Brazilië. Kl. 8°, 150 pp. Amsterdam J. H. de Bussy, 1888. f 1,75. (Ref. van Metzger, n°. 1598).

⁴⁾ M. Schanz, Brasilianische Reiseskizzen aus dem Jahre 1887. Kl. 8°, 121 pp Leipzig, Rossberg 1889. M. 1,50. (Ref. v. Polakowsky, n°. 1594).

L'Empire du Brésil. Province de São Paulo. Rio de Janeiro, C. G. da Silva, 1888.— Dit werk maakt deel uit van de verzameling: "Les Guides de l'Etoile du Sud", en i geschreven door Charles Morel, redacteur van het dagblad "l'Etoile du Sud".

E. Perrod, La provincia de São Paolo, Bresile. 8°, 258 pp., met kaart. Roma Ministerio degli Esteri 1888. (Aankondiging in Boll. Soc. geogr. It. 1889, p. 51-54)

alsmede verschillende artikelen in tijdschriften, zooals de Revue Suisse 1), Ham's Meteor. Zeitschrift 2). Ook de beschrijving der provincie São Pedro do Rio Grande do Sul door Max Beschoren 3) moet hier genoemd worden. De schrijver is vele jaren lang in die streek werkzaam greest als landmeter; in 1887 kreeg hij van het hoofd der Braziliaanske grenscommissie aan de Uruguay, den baron van Capanéma, de spiracht om, ten behoeve der triangulatie, signalen op te richten in int gebied van Nonohay, Pepery en Chapecó, bij welken zeer moeielijten en inspannenden arbeid hij omkwam. Zijne manuscript aanteekeningen zijn, op uitnoodiging van Prof. Supan, door Henry Lange bewerkt en uitgegeven. Het werk bestaat uit een "Reisebericht" en een hoofdbank over geschiedenis, topographie, klimaat, handel en industrie, landbank en kolonisatie en bevat, gelijk men kan nagaan, vele belangrijke gevens aangaande het nog zoo weinig bekende gebied der afgelegene kovincie.

AUSTRALIË EN POLYNESIË.

De reizen en onderzoekingen in Polynesie hebben zich bepaald tot feuw-Guinea en de in de nabijheid liggende eilanden. Dr. Sonnenchein bezocht, in Oct. 1888, het verder afgelegen Roemanzof-eiland tot de Radak-keten (Marshall-groep) behoort en het Pleasant- of faoeroe-eiland ten Z. daarvan, dat tot de Duitsche bezittingen gerekend ordt. J. Douglas deed in 1887 een verkenningstocht door den fouisiaden-archipel. Die daarna werd ingelijfd bij de Engelsche koloe Nieuw-Guinea. In het laatst van 1888 werden die eilanden opnieuw

¹⁾ V. de Floriant, La région des Amazones. Rev. Suisse, XXXVIII, p. 243.

²⁾ J. Hann, Meteorologische Beobachtungen in Brasilien. 1. Bahia, 1886—87; 2. Experatur in Sant' Anna do Sobradinho am Rio San Francisco. 1883—86. Met. Zeitschr. 188, V. p. 83.

⁹⁾ Max Beschoren, São Pedro do Rio Grande do Sul. Erg. Heft nº. 96 zu PM. tha, J. Perthes. Gr. 8°, 91 pp. met eene oorspronkelijke kaart van het noordweste-gedeelte der provincie. (1886). Sch. 1:1,250,000.

⁴⁾ PM. '89, p. 127. Mitt. aus Deutsch. Schutzgeb. II, p. 26. — Dr. Sonnenschein, berkungen über die Wotje- oder Rumansoff-Insel, Radak-Archipel. Met kaart van de sig-reede en de Lagediack-straat; p. 19—26: Aufzeichnungen über die Insel Nawen, bezant Island.

⁵⁾ PM. '89, p. 280. Proc. R. Geogr. Soc. Australasia, Vict. Branch. 1889, V, p. 46

bezocht door H. Thomson¹), als vertegenwoordiger des bestuurs gedeeltelijk met het doel om te onderzoeken of zij goud bevatten, me het oog op de nasporingen die reeds door goudzoekers in zuidoostelij Nieuw-Guinea waren gedaan, ten deele ook om de verhouding met d inboorlingen te regelen, van welke velen nog nimmer een blanke gezie hadden. De Salomons-archipel werd bereisd door Krātke en Zoller waarbij het bleek dat het eiland Bougainville inderdaad uit twee eilande bestaat, daar het noordelijk gedeelte een afzonderlijk eiland vormt Boeka genaamd²). Verder zijn in den Bismarck-Archipel tochten gedaa door Schmiele op Birara (N. Pommeren), die het noordelijke Gazelk schiereiland doortrok en door graaf Pfeil op Tombara of N.-Mecklenburg¹

Ook zijn weder eenige eilanden door Europeesche staten in bezit g nomen, nl. het eiland Foetoena ten N. O. van den Fidsji-archipel door Frankrijk, en de Union- en Phönix-groepen, ten N. van de Samo eilanden, door Engeland 5).

De litteratuur over de Nieuw-Zeeland-groep, Melanesie met Nieuw Guinea en Polynesië vindt men opgegeven in PML. 1889, nº 1298-1394. Ik vestig de aandacht op enkele werken en kaarten, o. a. de kaa der Chatham-eilanden van Mc Kerrow, welke berust op de opnemigen van S. P. Smith en J. Robertson in 1868 en 1883, en die belan rijke afwijkingen vertoont met de bestaande kaarten 6), het werkje van S. P. Smith en J. Robertson in 1868 en 1883, en die belan rijke afwijkingen vertoont met de bestaande kaarten 6), het werkje van

¹⁾ New-Guinea: Narrative of an Exploring Expedition to the Louisiade and DE trecasteaux Islands. By Basil H. Thomson. Proc. 1889, p. 525, met kaart. Honder Engelsch protectoraat staande gedeelte van Nieuw-Guinea werd in 1888 tot es Britsche bezitting verklaard.

²⁾ PM. '89, p. 104. Nachr. K. Wilhelms-Land 1889, p. 3, met kaart p. 15.

⁸⁾ PM. '89, p. 56. Nachr. K. Wilh.-Land 1888. — Schmiele, Expedition du das Innere der Gazellenhalbinsel, p. 154—159. — J. Graf Pfeil, Expedition nach N. Mecklenburg, p. 153.

⁴⁾ Niet ten N. W. gelijk er in PM. '89, p. 56 staat. Men zie Sydow-Wagner's I thod. Schulatlas (2de dr.), kaart n°. 40, waarop Fotoena ook reeds als eene Frank bezitting is aangegeven. Er is nog een Fotoena (of Errouan) dat tot de Nieuwe I briden behoort, volgens Stieler's Handatlas (1876) op nagenoeg 170° O. L. v. Gr. 19° 80' Z. B.

⁵⁾ Volgens eene mededeeling van H. Greffrath in PM. '89, p. 254. De inbenneming had plaats in Juni-Juli 1889, door het Engelsche oorlogschip Egeria", ke tein Oldham, en staat in verband met de aanwezigheid van guano op de onbewoot Phönix-eilanden, en met de plannen tot het leggen van een telegraafkabel van Niet Zeeland naar Vancouver-eiland.

⁶⁾ J. Mc. Kerrow, Map of the Chatham Islands. 1:126,720. Wellington 18 Refer. van Wichmann, no. 1299).

Smith over de Kermadec-eilanden 1), de bibliographische en statistische overzichten betreffende Nieuw-Zeeland²), de werken over dat eiland van Gisborne, Bradshaw, Payton en Meyners d'Estrey 3). De arbeid van den laatstgenoemde is niet meer dan een beknopt overscht, door den schrijver - gelijk hij in de inleiding zegt - hoofdzatelijk ontleend aan de mededeelingen van een jeugdig Engelschman, net wien hij in den trein kennis had gemaakt. Deze berichtgever, wiens naam niet wordt genoemd (evenmin als de andere door den schrijver gebezigde bronnen), had in twee jaren de verschillende landen der wereld bezocht, ze onderling vergeleken met het oog op de vraag waar hij zich zou vestigen en had toen Nieuw-Zeeland uitgekozen, waar men van zijn tapitaal tien percent maakt in plaats van drie, waar het klimaat gunstig en de bodem vruchtbaar is en dat, op dit oogenblik, de rijkste hulpbronnen bezit. Vooraf had hij den Mont-Blanc bezocht om dien te kunnen vergehijken met den Mount Cook der Nieuw-Zeelandsche Alpen. Men net dat die Engelschman lang geen "Stubengeograph" is, gelijk de Duitschers zeggen!

Den belangstellende, die omtrent dat groote eilandengebied iets meer wil weten, zal de lezing van een der bovengenoemde grootere werken, na het overzicht van Meyners d'Estrey, nog wel aan te raden zijn; de arbeid van Gisborne o. a. wordt in de Proceedings zeer geroemd.

l) S. P. Smith, The Kermadec Islands. 8°, 29 pp., 1 kaart. Wellington 1887. (Ref. 722 Supan, n°. 1817). Zie ook van denzelfden schrijver: Geological notes on the Kermadec Group. New Zealand Institute 1888, XX.

²⁾ J. D. Davis, Contributions towards a Bibliographie of New-Zealand. 8°, 77 pp. Wellington and London, Petherick, 1887. De opgaven hebben betrekking op het tijdperk 1739—1886.

Statistics of the Colony of New-Zealand for the year 1887. 1. XXXIX on 393 pp., Wellington 1888. (Ref. v. Supan, no. 1814).

³⁾ W. Gisborne, The Colony of New-Zealand, its History, Vicissitudes and Progress. 8°, 860 pp., London, Petherick & C°. 1888. Pr. 7 sh. 6 d. (Aangekondigd in sthe Ashenseum", 16 Febr. 1889, p. 212. Proc. 1889, p. 190 en Sc. G. Mag. 1889, p. 222).

J Bradshaw, New-Zealand of To-Day (1884--'87). London, S. Low. 1888. (Assgekondigd in "Nature", 7 Febr. 1889, p. 340; "the Academy", 9 Febr. 1889, p. 39; "the Athenseum", 16 Febr. 1889, p. 321).

E. W. Payton, Round about New-Zealand. 8°, 860 pp. London, Chapman & Hall, 1888. Pr. 12 sh. (Aangekondigd in »Nature" 7 Febr. 1889, p. 840; »the Athenaeum", 16 Febr. 1889, p. 221; »the Academy" 99 Dec. 1888, p. 416).

Dr. Comte H. Meyners d'Estrey, La Nouvellle-Zélande, Rev. Géogr. 1889, p. 81-91.

Onder de werken over Polynesië en Melanesië, noem ik voorts, behalve het den lezers van ons tijdschrift bekende artikel van W. F. Andriessen over de Samoa-eilanden 1), het werk van den bekenden onderzoeker Finsch over zijne reizen in Kaiser Wilhelmsland en Engelsch Nieuw-Guinea 2), dat voor het grootste gedeelte van ethnographischen aard is. Kirchhoff geeft in het referaat een overzicht van de in het werk voorkomende kustbeschrijvingen, die uit een geographisch oogpunt van beteekenis zijn.

De overige publicaties hebben betrekking op Nieuw-Guinea; alvorens deze te bespreken, wensch ik echter eerst Nieuw-Holland te behandelen.

Het aantal ontdekkingsreizen van eenige beteekenis is daar niet groot; J. J. East deed in Sept. 1888 geologische onderzoekingen in het oostelijk gedeelte van het Macdonnel- en Hart-gebergte en vond op verschillende plaatsen goud; daarentegen beweert hij dat er geen robijnen in het Macdonnel-gebergte voorkomen, terwijl D. Lindsay ze daar, in datzelfde jaar, ontdekt zou hebben 3). Ook beweert deze dat de mededeelingen van een zekeren Willshire betreffende de aanwezigheid van een werkenden vulkaan in het binnenland van Australië — 320 km. ten N. W. van Alice Springs — wel juist kunnen zijn.

Uit de onderzoekingen van Favenc in het gebied der Gascoyneen Ashburton-rivieren in West-Australie⁴) is gebleken, dat er in het gebied van verschillende zijrivieren der laatstgenoemde, uitmuntend weideland is; die zijrivieren werden door hem de Cunningham, de Jackson en de James-rivier genoemd. De bovenloop der Ashburton wijkt nog al

¹⁾ In jaargang 1889 Meer Uitgebr. Art., p. 840.

De door het Hydrogr. Office te Washington, de Duitsche admiraliteit en de Service hydrographique de la marine uitgegeven kaarten van verschillende der eilanden groepen van Polynesië, zijn opgegeven onder de nummers 1874—'88 in PML. 1889; daaronder ook O. Herkt's, Spezialkarte der Samoa-Inseln. 1:850,000. Glogau, Fleming 1889. Pr. 0,50 M.

²⁾ O. Finsch, Samoafahrten. Reisen in Kaiser Wilhelms-Land und Englisch Neu Guinea in den Jahren 1884 und 1885 an Bord des deutschen Dampfers »Samoa", 8°, 390 pp. Mit Karte. Leipzig, Hirt 1888. Pr. 12 M. (Zeer uitgebreid referaat van Kirchhoff, n°. 1835).

⁸⁾ PM. '89, p. 54 en 104. — India and Colonies, 6 Febr. 1889. — D. Linday, Map of the Central Australian Ruby Field, Adelaide 1888.

⁴⁾ Explorations in het region of the Upper Gascoyne and Ashburton rivers, West Australia. By Ernest Favenc, Proc. 1889, p. 492 vlg.

E. Favenc, The past history, present trade and resources of Western-Australia.
4°, 84 pp. Sydney, Turner & Henderson 1887. Met kaart.

af van de voorstelling op sommige kaarten. Het is niet waarschijnlijk dat er in die streken ooit mineralen zullen gevonden worden, met uitmedering wellicht van goud bij de bron der Gascoyne.

Eene sedert jaren door W. H. Tietkens beraamde expeditie naar bet gebied van het Amadeus-meer schijnt nu te zullen plaats hebben, met Alice Springs als uitgangspunt 1). Ook zijn er nog andere tochten ondermen in verschillende gedeelten van het vasteland, maar omtrent de resultaten daarvan is nog niets mede te deelen.

Wat de nieuwere kaarten van Australië aangaat vermeld ik die van bet noordelijk territorium door Reichardt²), op welke is aangewezen welke terreinen door kolonisten bezet zijn, alsook waar tin en goud voortomen; ook is de reeds bestaande spoorweg er op geteekend. Eene goede taart van het geheele vasteland is die van Skene, waarop spoorwegen en telegrafen nauwkeurig zijn aangegeven, terwijl bij den tweeden druk met de resultaten der nieuwere onderzoekingen rekening is gehouden³). Ook van Handtke's kaart van Australië dient hier gewag te worden gemaakt⁴).

Onder de grootere werken noem ik die van Knight, Gill, Russel, Griffin, Liveridge, Curr en Vincent, 5) terwijl er nog

l) PM, '89, p. 127.

²⁾ Schaal 1: 380,160. Pr. 1 sh. (Zie PM. '89, p. 126).

A. J. Skene, Continental Australia. Sch. 1: 8,200,000. 2de dr. Melbourne 1888.
 PM. '89, p. 232).

⁴⁾ F. Handtke, Generalkarte von Australien. 1: 20,000,000. 18 Aufl. chromolith. Imp. Fol. Glogau, Fleming, 1889. Pr. 1 M. (Refer. v. Supan PML. '89, n°. 1244).

⁵⁾ G. Ch. Knight, Western Australian Year-book for 1887. 8°, 53 pp. 1 kaart. Path 1888. (Ref. v. Supan, n°. 1272).

Th. Gill, Bibliography of South Australia. 8°, 118 pp. 1886. Colonial and Indian Exhebition in London 1886. (Als voren, n°. 1269).

H. S. Russel, The Genesis of Queensland; an account of the great exploring journeys to and over the Darling Downs. 86, 633 pp. met kaarten, Sydney, Turner & Headerson, 1888, 21 sh.

G. W. Griffin, United States Consul at Sydney. New South Wales; her commerce of resources. 8°, 293 pp. Sydney, Ch. Potter, 1888. (Aankondiging in Sc. G. Mag. 1889, p. 167).

A. Liveridge, The Minerals of New south Wales. Met kaart. London, Trüb-

E. Curr, The Australian Race. 4 Dln. Cs. 1700 pp. Melbourne. John Freres en landen (Trübner) 1886.

J. E. M. Vincent, The Australian Irrigation Colonies on the River Murray in

tallooze tijdschriftartikelen worden opgegeven in PML. '89, n°. 1243—1297, die men grootendeels ook in de bibliographie in ons tijdschrift vindt.

Uit het jaarboek van Knight blijkt dat de bevolking van West-Australië vooruitgaat; op het eind van 1887 telde zij 42,488 zielen. Slechts een zeer klein gedeelte van den bodem wordt vooralsnog bebouwd, met graan — dat echter nog niet in de behoefte der bevolking voorziet — vruchten en met den wijnstok (hoewel in zeer geringe mate). Verder heeft men er schapenteelt (1,9 mill. stuks), houtuitvoer, o. a. van den Jarrah-boom (Eucalyptus marginata) en sandelhout, vischvangst en paarlvisscherij. Er wordt een weinig lood en koper gewonnen.

De bibliographie van Gill heeft betrekking op de ontdekking des lands en de vroegere en latere reizen, de inboorlingen, de natuurlijke gesteldheid, de geschiedenis, enz.

Voor de kennis van de onuitputtelijke hulpbronnen van Australie is het werk van Griffin zeker van groote waarde. De meeste werken over Nieuw-Zuid Wales, waarin over de rijkdommen van het land werd uitgeweid, waren geschreven door personen die rechtstreeks belang hadden bij den voorspoed van het land, zegt de referent in Sc. G. Mag.; maar: "This volume comes from an outsider: it is dull, it is dry, it is intensely statistical, and absolutely devoid of literary pretension; but it shows the skeleton of the country in its enormous strength and vast resources, and through all can be seen the beating of a heart of inexhaustible energy, destined some time to make it a great power in the world. Not one of the colonial enthusiasts, in their more elaborate treatises, has impressed us so strongly as this matter-of-fact American consul, with the greatness and future of Australia."

De onmetelijke rijkdommen aan mineralen in Australië en, meer in het bijzonder in Nieuw-Zuid Wales, worden door Liveridge besproken. Het bedrag der totale waarde aan mineralen, tot het eind van 1887, in laatstgenoemde kolonie, is 72,938,125 L. St. De rijkdom aan steenkool is buitengewoon groot; de goudopbrengst is achteruitgegaan; ook tin en koper komen veel voor.

Over Curr's arbeid raadplege men het uitgebreide referaat van Kirchhoff.

Daar de samenstelling van een overzicht als het bovenstaande veel

Victoria and South Australia. 4°, 124 pp. London, Chaffey, 1888. Pr. 3 sh. 6 d. (Ref. van Supan, n°. 1295).

tijd kost, zoodat ik er geruimen tijd geleden aan ben begonnen, en het ter perse leggen bovendien, door verschillende omstandigheden, zeer rettraagd is, zijn er, na de voltooiing, nieuwere berichten verschenen over sommige reizen, maar in verhouding tot het geheel hebben deze toch geen overwegend belang. Men bedenke bovendien dat het overzicht eigenlijk alleen betrekking heeft op het vorige jaar.

In het tweede gedeelte van dit overzicht zal Nieuw-Guinea bij Nederlandsch Oost-Indië behandeld worden en daarop zal de bespreking volgen van Azië, Europa en de Poolstreken en Oceanen.

Afgesloten op het eind van Maart.

VERSLAG

DER

NEGEN EN VIJFTIGSTE ALGEMEENE VERGADERING

VAN HET

KONINKLIJK NEDERLANDSCH AARDRIJKSKUNDIG GENOOTSCHAP.

GEHOUDEN TE AMSTERDAM, DEN 3DEN MEI 1890, IN EEN DER LOKALEN VAN HET GENOOTSCHAP "NATURA ARTIS MAGISTRA".

De vergadering werd geopend door den Voorzitter des Genootschaps, den heer W. F. Versteeg, die de aanwezigen welkom heette en daarop den Secretaris het woord gaf, tot het uitbrengen van het jaarverslag, dat gedrukt en reeds in handen der aanwezige leden was. De Secretaris vestigde de aandacht op enkele daarin voorkomende mededeelingen en op de bijlagen, waaruit de stand der werkzaamheden van het Genootschap het best kan blijken 1).

Daarop zeide de Voorzitter het volgende:

"Hoe beknopt maar niettemin zakelijk onze Secretaris dit zijn verslag ook moge hebben ingericht, zoo zal het toch de vergadering niet ontgaan zijn dat er in het afgeloopen jaar weder heel wat werk voor 's Genootschap's Bestuur te doen is geweest; waartoe vooral de herhaalde, dikwijls langwijlige maar geenszins altijd even verkwikkelijke briefwisseling met het Ministerie van Koloniën, over de expeditie op Flores, in geen geringe mate heeft bijgedragen. Nog steeds verkeert het Bestuur in de hoop dat althans de zending van Dr. ten Kate zal kunnen plaats vinden.

¹⁾ Zie p. 463 vlg. van deze aflevering.

"Meer is echter niet te verwachten, want aan het zoeken naar een opvolger van den ingenieur van den Broek voor het opnemingswerk is, bij de bestaande onzekerheid, in 't geheel niet gedacht kunnen worden, en ook tot het uitzenden van een natuurhistoricus vermochten geen voldoende stappen te worden gedaan. Intusschen is van den heer van den Broek nog een nader schrijven, van 't begin der maand Maart, ontvangen, waaruit bleek dat de werkzaamheden, aan het verifieeren zijner metingen verbonden, meer tijd vorderen dan hij zich had voorgesteld, waarom hij nog een à twee maanden langer op Larentoeka dacht te blijven en dus op dit oogenblik denkelijk nog aldaar werkzaam is. Zijn kaart en rapport, waarin ook een hoofdstuk aan de geschiedenis der volkstammen zil gewijd zijn en dat van eene Hollandsch-Soloreesche woordenlijst zal verzeld gaan, zijn inmiddels terstond na gereedkoming toegezegd, terwijl ook eene kleine bezending ethnographica is verzameld, die voor 's Rijks Museum te Leiden is bestemd. Die bescheiden, zoo ook de eerlang van den hoogleeraar Wichmann ingewachte rapporten, zullen nog dit jaar in het tijdschrift worden opgenomen.

"Omtrent het proces Brinkman valt nog te vermelden dat dezer dagen een voorstel tot schikking van zijne zijde is ingekomen, dat echter als geheel onaannemelijk is moeten worden van de hand gewezen.

"Ten behoeve van de kwestie "geologische en geographische onderzoekingen in Nederland", waarbij het verkrijgen eener verbeterde geologische kaart van Nederland het meest op den voorgrond is getreden, heeft een onzer meest bevoegde bestuursleden op zich genomen eene nota samen te stellen, waarin de hooge wenschelijkheid van het bezit van zoodanige verbeterde kaart zal worden uiteengezet en de middelen aangegeven om daartoe te geraken. De onderzoekingen die daarvoor noodig zijn zullen dan de geographie van ons land tevens ten goede komen en ons Genootschap stelt zich voor die zaak, na overleg in de eerste plaats met de geologische Commissie van de Koninklijke Akademie van Wetenschappen, doch ook met voorname landbouw- en nijverheidsinstellingen te trachten tot stand te brengen.

"Ik meen in den geest der vergadering te spreken indien ik onzen Secretaris dank betuig voor den velen arbeid dien hij zich weder in 's Genootschaps belang heeft getroost; maar aan hem, zoomede aan onzen zoo hooggeachten Onder-voorzitter Professor Kan, als redacteuren van het Tijdschrift, wensch ik hier ook openlijke hulde te brengen. De nieuwe jaargang, geopend met zoo belangrijke stukken van de hand van Dr. Hagen over Oost-Sumatra en van Prof. Martin over de geologie van het ooste-

lijkst deel van onzen Indischen Archipel, beloost dubbel belangrijk ti worden als daarin ook verschijnen de reeds genoemde tapporten var Prof. Wichmann en van V. d. Broek, zoomede het werk op Key door Wertheim, die zich, blijkens het stuk van Prof. Martin. als goed verza melaar deed kennen, en vooral door den voortreffelijken Planten aldaar verricht.

"Dit jaar had het Genootschap weder het verlies te betreuren van meerdere buitenlandsche en binnenlandsche leden door den dood om ontrukt. Ik zal slechts een enkele noemen: de groote Azië-reiziger Praje walski in 't buitenland, die juist zijn zesde groote ontdekkingsreizoude ondernemen, bij wiens afsterven een brief van rouwbeklag aar het Russisch Aardrijkskundig Genootschap werd gezonden, waarop van den Grootvorst Voorzitter een vereerend antwoord is ontvangen.

"De hoogleeraar Buys Ballot in Nederland, van wiens bekende groots wetenschappelijke verdiensten ik hier zwijg, doch dien ik wensch te herdenken als den vriend van ons Genootschap, als den eenvoudigen beminnelijken geleerde, wiens streven ook door ons Genootschap op 200 hoogen prijs werd gesteld, dat o.a. het voorbeeld gaf om zijne pogingen te steunen om Nederland te doen deelnemen aan het internationaal meteorologisch onderzoek op hooge breedten rondom de Noordpool.

"Zijn onze ten vorige jare genite wenschen voor het herstel van Z. M. onzen geërbiedigden Koning, zoo ook van onzen zoo hooggeachten Eere voorzitter gelukkig vervuld, het zij mij vergund thans soortgelijke wenschen te uiten voor het behoud van een 82 jarigen vriend van ons Genootschap, die sedert geruimen tijd aan het ziekbed is gekluisterd en wiens behoud in de eerste plaats voor zijn eigen werk, voor de voortreffelijke inrichting waarin wij ook nu weder gastvrijheid genieten, doch ook voor ons Genootschap in zoo hooge mate gewenscht is. Wie herinnert zich niet den opgewekten grijsaard, die zoo menigmaal onze vergederingen bijwoonde en wiens oogen steeds tintelden van genot als hij belangrijke wetenschappelijke voordrachten mede mocht aanhooren; Westerman, die bij het bestuur van Artis steeds onze warme voorspraak was, als wij de hulp van dat lichaam inriepen bij het tot stand brengen van wetenschappelijk onderzoek. Moge het hem gegeven zijn nog eenige jaren werkzaam te blijven, want dat is en was zijn leven 1).

¹⁾ Gelijk den leden bekend is, mocht deze wensch, helaas, niet vervuld worden, want slechts korten tijd nadat de Voorzitter bovenstaande woorden gesproken had, is de heer Westerman, op den 9den Mei, overleden. Zie de necrologie in deze aflevering.

"Nog zij vermeld dat tot den beroemden Afrika-reiziger, ons Eerelid Staley, bij diens behouden terugkeer, een adres van welkomst is gericht. Werd Stanley dezer dagen in België en wordt hij op dit oogenbik in Engeland feestelijk ontvangen, ous Genootschap is daarbij de at aangedaan, dat zoowel het Brusselsche Aardr. Genootschap, dat m dezer dagen ontving, als het Londensch Genootschap dat hem memorgen zal ontvangen, daarbij Uwen Voorzitter tot bijwoning uitaodigden, waaraan hij echter tot zijn leedwezen geen gevolg heeft kunden geven.

"Ten slotte wensch ik den leden mede te deelen dat het voornemen batat in de volgende maand onze 600 Algemeene Vergadering in den Hag te houden, daartoe in de gelegenheid gesteld door den heer Tromp, te ons een voordracht op Indische, en door ons bestuurslid Duren, die eene op Nederlandsche toestanden betrekkelijk, toegezegd bebben."

De Penningmeester, de heer A. W. van Eeghen, bracht vervolgens het het achter 1) opgenomen financiëel verslag over 1889 uit en deed eenige nededeelingen aangaande de begrooting voor het jaar 1890, welke is gepained in ontranget op f 10.835,88 en in uitgaaf op f 11.841,185.

Eindelijk verkreeg Prof. Dr. H. C. Rogge het woord om, namens de bliothecarissen, verslag uit te brengen aangaande den toestand der biblioheek en der kaartenverzameling des Genootschaps, daar Dr. I. Dornseiffen, te ralks anders gewoonlijk doet, ditmaal door ongesteldheid verhinderd de vergadering bij te wonen. De heer Rogge zeide dat de vermeerring der boeken- en kaartenverzameling slechts in geringe mate het evolg was geweest van gedane aankoopen, maar hoofdzakelijk van ontangen geschenken, zoowel van de departementen van algemeen bestuur n bijzondere instellingen als van belangstellenden in het binnen- en buitenland. Aan verzoeken om toezending van werken werd steeds met neeste bereidwilligheid voldaan, o.a. nog niet lang geleden, door de Directie van het Koninklijk Nederlandsch Meteorologisch Instituut, welks publicaties niet volledig in de bibliotheek aanwezig waren. Onder de bijandere personen, die de bibliotheek met geschenken verrijkt hebben, poemde de spreker de heeren G. W. C. van den Heuvell, Jhr. Mr. J. L. W. Quarles van Ufford en, uit het buitenland, Cl. R. Markham. In het tijdschrift zal eerlang eene lijst voorkomen van alle aanwinsten

r bibliotheek en zulk eene opgave zal voortaan jaarlijks worden op-

I) Zie p. 505.

genomen. Verder zal er eene lijst worden uitgegeven van alle in a bibliotheek des Genootschaps aanwezige boeken en kaarten; deze z verkrijgbaar worden gesteld voor alle leden die daartoe van hun verlangt doen blijken. Spreker hoopt dat die lijst — geen eigenlijke catalogus voor menigeen een prikkel moge zijn om de bibliotheek te gedenker want deze is waarlijk nog zeer arm aan boeken, uithoofde van de ze geringe ervoor beschikbare geldmiddelen. Waar toch zal men eene ve zameling van belangrijke geographische werken moeten zoeken als h niet is in de bibliotheek van ons Genootschap?

Na dankbetuiging van den Voorzitter aan de genoemde sprekers vo de uitgebrachte verslagen, werd overgegaan tot behandeling der, do het Bestuur voorgestelde, veranderingen in het reglement, waaraan overgadering, na eenige toelichting betreffende enkele dier wijzigingen, la acclamatie hare goedkeuring hechtte, zoodat er geen stemming behoefe plaats te hebben.

De aangebrachte veranderingen zijn de volgende:

Art. 1. te lezen: Het Koninklijk Nederlandsch Aardrijkskund Genootschap, enz.

Art 3b. te lezen: het uitgeven van een tijdschrift.

In art. 11. regel 3 te lezen: een secretaris, in plaats van: twee s cretarissen.

In art. 13 vervalt de volzin: "Het vertegenwoordigt het Genootscha naar buiten," maar wordt achter de woorden (regel 5): "Bestun dat" ingelascht: "het Genootschap naar buiten vertegenwoordigt en

Het Bestuur des Genootschaps, vertegenwoordigd door Voorzitter (Secretaris, werd door de Leden gemachtigd de Koninklijke goedkeuris op die wijzigingen aan te vragen.

De Voorzitter deelde daarop mede dat de volgende bestuursleden as de beurt waren om af te treden: de heeren Dr. I. Dornseiffen (herkie baar), H. Bouman, W. van Hasselt, J. Kuyper, N. Mac Leod, Mr. I. D. Levyssohn Norman, Martinus Nijhoff en W. F. Versteeg (herkiesbaar terwijl er nog twee vacatures waren te vervullen. Den heer Levyssoh Norman, die ter vergadering tegenwoordig was, zeide hij dank voor hetgee door hem als lid des Bestuurs in het belang van het Genootschap verrici is; aan de overige aftredende leden zal schriftelijk dank betuigd worden

De volgende tweetallen ter verkiezing van nieuwe bestuursleden ware door het Bestuur opgemaakt:

1. A. A. Beekman en Dr. H. Blink; 2. Dr. I. Dornseiffen en Dr. J. C. Loman; 3. Jhr. Mr. W. Elout van Soeterwoude en A. D. Hagedoort

Mr. W. Baron van Goltstein en J. W. Welcker; 5. F. G. Kramp en de Bas; 6. Dr. G. A. F. Molengraaff en Prof. Dr. K. Martin; 7. Hendt P. N. Muller en Prof. Dr. S. Naber; 8. Mr. O. J. H. Graaf van Indurg Stirum en Dr. W. N. du Rieu; 9. W. F. Versteeg en B. Heling; 10. Prof. Dr. Max Weber en Prof. Dr. G. A. Wilken. Prof. Werverzocht echter, wegens veelvuldige bezigheden, buiten aanmerking blijven.

De heer C. Abels vroeg of de verkiezing van bestuursleden door midvan tweetallen eigenlijk wel in overeenstemming is met het reglement, arin nergens over tweetallen wordt gesproken; 1) door het voorstellen tweetallen geeft het Bestuur te kennen, welke personen het bij voorwenscht gekozen te zien. De Voorzitter antwoordde dat het laatste strekt niet in de bedoeling des Bestuurs ligt, en dat het opmaken van etallen reeds vele jaren gebruikelijk is geweest, zonder dat daarover It eenige aanmerking is gemaakt. Overigens gaf spreker toe dat het dement het niet voorschrijst. De heer J. F. Niermeyer was van meeg dat het opmaken van tweetallen door het Bestuur, zelfs in strijd is t het reglement. Op voorstel van den Secretaris werd daarop beslodat de aanwezigen, uit de twintig hier boven genoemde personen, r voor zich er tien zouden aanwijzen die zij het liefst in het Bestuur schten te zien; terwijl de Voorzitter aan de heeren Prof. Dr. S. A. ber en F. de Stoppelaar verzocht den uitslag der verkiezing te willen maken, uit de stembriefjes. Het bleek toen dat de meeste stemmen ebracht waren op de heeren Versteeg (28), Beekman (27), Dornseiffen), Molengraaff (25), Muller (25), Kramp (22), Elout (16), V. Goltn (15), Blink (14) en Van Stirum (14). Het totaal der uitgebrachte mmen was 29 geweest. De Voorzitter vroeg aan de ter vergadering wezige heeren Molengraaff, Kramp en Blink of zij bereid waren de hen uitgebrachte benoeming te aanvaarden, waarop de beide eerstoemden bevestigend antwoordden, terwijl de heer Blink een paar dagen enktijd verzocht 2). De Voorzitter zeide dat hij, dankbaar voor het

Art. 14. lastete volsin: De benoeming van bestuursleden geschiedt uit eene voorht, daartoe door het Bestuur opgemaakt.

tt 18. Benoemingen van bestuursleden door de Algemeene Vergadering geschieden gesloten briefjes, bij volstrekte meerderheid van stemmen. Als bij de eerste stemte de volstrekte meerderheid niet verkregen wordt, heeft een tweede vrije stemming ts. Wordt deze ook dan niet verkregen, dan heeft er een herstemming plaats tuste de twee personen, die alsdan de meeste stemmen hebben erlangd.....

De heer Blink heeft sedert doen weten dat hij de benoeming aanvaardt.

vertrouwen hem door de vergadering betoond, bereid was het voorzitter schap te blijven waarnemen, onder voorbehoud dat hij het wellicht birnen drie jaren zal neerleggen.

Nadat de huishoudelijke werkzaamheden waren afgeloopen, werd het woord gegeven aan den heer F. G. Kramp, tot het doen van eenigi mededeelingen over den Grooten Muur van China.

Spreker begon met er op te wijzen dat er in Europa eigenlijk eers sedert kort juiste berichten aangaande dien muur zijn geweest; reeds it 1655 sprak de geleerde Jezutt Martinus Martinius in de voorrede vat zijn Atlas Sinensis (gedrukt bij Blaeu) over de "dunckele Wissenschafft daaromtrent in ons werelddeel. En zoo is het thans nog veelal; terwij sommigen spreken van een "steenen gordel", die het groote rijk omgeent ontkennen anderen, o. a. de abt Larrieu 1) het bestaan van den mui bijna geheel.

Ziet Von Richthofen in den grooten muur een wonderwerk en een de aanleidingen tot de volksverhuizingen, Pauthier en anderen beschouwe dat geweldige werk als een voortbrengsel van menschelijke dwaasheid als iets onzinnigs.

Met het oog op dat alles en op hetgeen ook door onzen landgenood den hoogleeraar De Goeje, onlangs werd medegedeeld in de Versl. Meded. der Kon. Akad. v. Wet. aangaande de volken Gog en Magog in verband met den Chineeschen Muur, acht spreker het niet van gewicht ontbloot de aandacht te vestigen op enkele punten, welke in deze van geographisch belang zijn.

Gewoonlijk neemt men aan dat de muur gebouwd zou zijn op bevet van Keizer Sji-hwang-ti in de 3de eeuw vóór Christus; ook vindt men on onze kaarten nog een binnenmuur en twee kleinere zijtakken van de muur geteekend.

Het oudste bericht aangaande den Chineeschen Muur werd in Rulland bekend door twee Kozakken die in 1567 (dus nog vóór den toch van Yermak) door Mongolië tot Kalgan en Peking waren doorgedrom gen; hun reisverhaal was in de 2de helft der 16de eeuw in Rusland zee bekend.

In het overige Europa vernam men het eerst ervan in de tweede held der 16° eeuw, voornamelijk door Gonçalez de Mendoça; bij de schrijver der oudheid (Strabo, Ptolomaeus) en der middeleeuwen (Marco Polo

¹⁾ Zie ons tijdschrift 1887, M. p. 469.

Odnico di Pordenone) wordt er met geen enkel woord gewag van gemakt. In de Chineesche litteratuur heeft men kostbare bronnen voor de kemis van het ontstaan van den muur, nl. in het Sii-ki van Sze-mathich en in de Annalen der vroegere Han-Dynastie. Volgens deze bemeten heeft Sji-hwang-ti in 215 v. C. den generaal Moeng-tien uitgeanden tot bestrijding der Hioeng-noe, de voorouders der latere Turkthe volken; het land tusschen de groote bocht der Hwang-ho - tegenwordig Ordos geheeten — werd hun ontnomen en met den bouw van n muur werd in 213 v. C. een begin gemaakt, hoewel er reeds kleine taken muur hier en daar aanwezig waren. Die oudste muur liep ongeter van Lin-tau 1), op de grens van het land der Tangoeten, tot de Liauiner, ten Z. van Moekden. In het Kwang-yu-ki, eene beschrijving der wincien van het Chineesche Rijk, waarvan een exemplaar zich in de bliotheek der Leidsche Universiteit bevindt, wordt die muur op acht teschillende plaatsen vermeld en daaruit kan zijne richting voor een geleeke met vrij groote juistheid worden nagegaan; zij verschilt met die un den tegenwoordigen, vooral in de westelijke helft, waar de nieuwere messal noordelijker ligt, en zich veel verder naar het Westen uitstrekt. Omtrent de samenstelling ervan beweren Pater Hyacinth en Dr. E. Bretchneider dat er van een steenen muur geen sprake is; het moet een n zijn geweest van aarde of löss. Wat de zendelingen in de 17de eeuw natent den muur hebben geschreven, wordt niet door de Chineesche connen bevestigd.

Na den val der Han-dynastie (220 n. C.) kwam die muur in verval; in k annalen der Thang-dynastie (618—907 n. C.) wordt niet over muren wallen gesproken; toen later Toengoezische stammen bezit namen an Noordelijk China verviel alle reden van bestaan van den muur en kas ook later het geval, na de verovering van China door de Monden, in de 13de eeuw. Zoo laat het zich verklaren dat Marco Polo en Merico di Pordenone niet over een muur spreken, of dat de Arabische rograaf Ibn Batoeta, in Canton gekomen met het oorspronkelijk Joodscharbisch geloof aan den muur van Gog en Magog, tot zijne verwonden niemand kon vinden, die hem daarover wist in te lichten.

Na de verdrijving der Mongolen in 1368 was er weder reden om een mur te bouwen en dat geschiedde dan ook, onder de Ming-dynastie. Me muur, gelijk hij nog thans bestaat — hoewel voor een groot deel

l) Het tegenwoordige Min-tsjoe, aan een zijtak van den Hwang-ho, ten Z. van ka-tsjoe-foe.

vervallen, daar de tegenwoordige Mandsjoe-dynastie geen reden heeft o hem te doen onderhouden — is samengesteld uit steenen borstweringen bij Liao-toeng en ten N. van Peking, verder uit gemetselde gedeelten van Kalgan westwaarts tot dicht bij den Hwang-ho uit een dam van los steenen en, nog meer naar het Westen, uit een aarden wal. Bij Pekir is de muur thans nog vrij goed.

De vroegere schrijvers — Gonçalez, Martini, Kircher e. a. — beschr ven niet den tegenwoordigen muur, maar den ouden; zij hadden get eigen opnemingen ervan gedaan, maar gingen voornamelijk af op out Chineesche geschriften. Een nauwkeuriger beeld verkreeg men eerst do de opnemingen der Jezuiten in de 18de eeuw, gepubliceerd in d'A ville's atlas.

In de laatste dertig jaren kwamen de Europeanen tot in het binne land van China en konden zij met eigen oogen waarnemen; maar ve hebben wij toch ook te danken aan hen die de taal en de geschie boeken der Chineezen bestudeerden. In een tijd, nu de aardrijksku dige studien zich zoozeer op natuurhistorisch terrein bewegen, is be niet onbelangrijk door een voorbeeld te doen zien, hoe veelzijdig hat taak is en van hoeveel belang ook historische onderzoekingen voor de geograaf zijn.

De Voorzitter betuigde, onder teekenen van levendige instemming de vergadering, zijn dank aan den heer Kramp voor diens belangwekkend mededeelingen, over een onderwerp dat in Europa steeds zoozeer de belangstelling heeft gaande gemaakt.

Na de pauze deed de hoogleeraar Dr. Max Weber eenige medede lingen over zijne reisen in Indie in het vorige jaar.

De heer Weber wenschte eerst het een en ander te zeggen over he doel waarmede hij zijne reis heeft ondernomen en vervolgens over zij bevindingen ten opzichte der bevolking van Flores en Centraal Celebe

Zijn doel was het instellen van zoölogische onderzoekingen zoowel q systematisch, als op anatomisch terrein. Wat het eerste aangaat is hem gelukt, zelfs in de onmiddellijke omgeving van Padang en Buiter zorg, tot dusver nog niet bekende dieren aan te treffen, b. v. een zest nieuwe slangen, dieren dus die anders zoo veelvuldig verzameld worder. In Sumatra en Java heeft hij zich vooral beziggehouden met bestudeering der zoetwaterfauna, ten eerste omdat die fauna nog zeer weinig beken is en slechts enkele onderzoekers zich terloops ermede hebben bezig gehouden, ten andere met het oog op de vraag hoe de zoetwatermeren van

matra, die veelal afgesloten bekkens vormen, welke niet in verbinding in met ander zoet water, — toch bevolkt werden. In de zoetwatermei van Zweden zijn dieren gevonden welke overigens alleen in de zee intomen, terwijl de zoetwaterfauna anders scherp gescheiden is van de fauna. Men heeft dat verklaard door aan te nemen dat die zoetwaterren vroeger met de zee in verbinding zouden hebben gestaan, dat het It fjorden zijn geweest.

oen zij langzamerhand van de gemeenschap met de zee werden afgeen en hun water geleidelijk zoet werd, hebben vele er in levende zeeen zich verplaatst, andere hebben zich, door aanpassing, naar de nieuwe asvoorwaarden geschikt en zoo is er eene "relicten-fauna" in die meanwezig. Uit de omstandigheid dat ook elders zeedieren in zoetwater aangetroffen, heeft men toen afgeleid dat zulks altijd relicten-dieren n. Dat was overdrijving, waarop reactie niet uitbleef: zoo is o.a. mer, naar sprekers meening, in een ander uiterste vervallen, door n in zéér enkele gevallen het bestaan van relicten aan te nemen, en nog uitsluitend op geologische gronden. Dat is zeker overdreven en de zoöloog moet hier meespreken. Daarom was het onderzoek van kuna der zoetwatermeren op Sumatra, welke kratermeren zijn, zoo ngrijk. Uit dat onderzoek is gebleken dat in sommige daarvan zeen voorkomen, terwijl de zeer hoog liggende meren zeer schaars bet zijn. Hoewel het onderzoek nog niet geheel is afgeloopen, vermeent ker toch wel te kunnen zeggen dat de grootere meren, zooals het kara-, en waarschijnlijk ook het Manindjoe meer, vroeger vermoedein verbinding hebben gestaan met de zee, terwijl de zeer hoog gelemeren op andere wijzen moeten zijn bevolkt, bijv. doordat kiemen enkele dieren door den wind of door vogels daarheen zouden zijn gebracht.

p Celebes en Flores was het hoofdzakelijk te doen om faunistische verelingen te maken, daar die streken door natuuronderzoekers nog slechts zelden bezocht zijn. Daarbij kwam de oude kwestie der grenslijn tusschen en Australië weer aan de orde; naar sprekers meening eene zoöloke. De door Wallace aangegevene grens berust hoofdzakelijk op de dieren, vogels, vlinders en torren en die keuze is gedeeltelijk niet kkig geweest. Men zal daarvoor bij eilanden, die dicht bij elkander n, dieren moeten nemen welke zich moeielijk verplaatsen, bijv. landusken en zoetwaterdieren, als visschen en mollusken, waarvan men verplaatsing over zee, bijv. met boomstammen enz. kan veronderen. De resultaten van zijne onderzoekingen daaromtrent kan spreker that nog niet mededeelen.

De heer Weber verhaalde daarop het een en ander betreffende zijn reis en aangaande land en volk van Flores en Celebes. In gezelschap ve zijne echtgenoote en van den hoogleeraar Dr. A. Wichmann, was hij va Batavia naar Macassar gegaan, met het doel van daar naar Flores te n zen. Men had evenwel vertraging ondervonden, o.a. doordat de gouve nementsstoomboot "Sperwer", welke de gouverneur van Celebes en o derhoorigheden welwillend ter beschikking van de reizigers had gestel vooraf had moeten dienen voor het overbrengen van een Nederlands ambtenaar die afgevaardigd werd naar den vorst van Wadjo, met wien een: kere Peters getracht had in het geheim een verdrag te sluiten, voorgeven dat hij een afgezant was van den Duitsche regeering. Na den terugks van de "Sperwer" was men toen, met dat schip, naar Bima en verw gens naar Bari en Reo gegaan en eindelijk, na het eiland Roesa Rai te hebben aangedaan, te Maumerie aan wal gestapt. Van daar was m naar Sikka, aan de zuidkust, gereisd en verder met eene prauw mi Endeh en het Rokka-gebied. De Westmoeson, in verband met de zwe branding aan de zuidkust, had de reizigers, na een kort verblijf in l laatstgenoemde gebied, genoodzaakt terug te keeren. De heer en n vrouw Weber hadden zich toen naar het weinig bekende gebied aan golf van Boni, in Celebes, begeven; Prof. Wichmann was naar Lam toeka gereisd.

Overgaande tot de bespreking der bevolking van Flores, deed de spaker opmerken dat er een scherp contrast is tusschen de bewoners de kust en die van het gebergte, in het binnenland. De laatstbedoelden wat men de eigenlijke, oorspronkelijke bevolking welke nooit onmiddelt aan het strand woont; zij zijn kroesharig, krachtig gebouwd en hebbe eene fraaie stem; wat hunne gesardheid aangaat doen zij, door hund levendigheid, denken aan de meer oostelijk wonende stammen der Aro Kei- en Tenimber-eilanden.

De kustbevolking bestaat uit vreemdelingen, die zich ten deele met de oorspronkelijke bewoners vermengd hebben. In het W. heest met sluikharige Bimaneezen, in Maumerie en Sikka een bevolking die steeltelijk uit Malaka en Celebes afkomstig, reeds sinds lang in oplaatsen gevestigd is; in de groote kampong Endeh schijnen het von namelijk Boegineezen en Makassaren te zijn, die zich vermengd hebb met de oorspronkelijke bevolking. Zij zijn sluikharig en hebben behalde niet zangerige stem der typische Maleiers, ook hunne meer stille s

tanheid. Terwijl Gerland, op zijne kaart der bevolking van den Archipel, de genslijn tusschen West- en Oost-Maleiers trekt ten O. van Celebes en Flores, zou spreker die lijn liever ten W. van het laatstgenoemde eiland willen trekken.

De kleederdracht op Flores wijkt zeer af van die op de groote Soendadinden. Bij de oorspronkelijke bevolking hebben de mannen slechts een det om de heupen, die tusschen de beenen wordt doorgehaald en dan machter bevestigd. De vrouwen in Sikka en Maumerie dragen een zeer lagen sarong, die over één schouder of wel over de borsten wordt gelagen. Elders hebben zij weer het bovenlijf naakt; in de Rokka-streek wordt de sarong op de schouders vastgestrikt. Daar vindt men ook wel ma kort jakje boven den om de heupen gedragen sarong. Bij de bereilag der stoffen wordt de katoen in strengen opgehangen en deze laatste mwoeld met fijne stukjes plantenvezel, tengevolge waarvan de omwoelde bedetten bij het verwen wit blijven; de vrouw moet, bij dat omslachtige met, het patroon dat zij wil verkrijgen, in haar hoofd hebben. Eerst kana wordt het stuk geweven.

Dat de oorspronkelijke bevolking kroesharig is blijkt ook uit enkele bedingstukken, nl. uit den doek dien de mannen om het lange, hoog istande haar dragen en uit kammen, soms met haneveeren versierd, elke men hier en daar aantrest, en die in sluik haar niet bevestigd unden kunnen worden.

Als sieraden heeft men armbanden, waarvan die van varkenstanden meenkomen met die op Nieuw-Guinea, verder vooral ivoren en zware, izalvormige koperen, welke gedragen worden boven de ellebogen en enkels.

De laatstgenoemde armbanden zijn vooral moeielijk te krijgen omdat niet over de hand afgestroopt kunnen worden, maar men ze moet wikkelen, en ook wegens de beteekenis die er door de draagster diklijk aan gehecht wordt, bijv. wanneer zij, verloofd zijnde, den armband haar aanstaande heeft gekregen.

Verder heeft men gouden en zilveren oorringen en armbanden, die kunstig gegoten worden, alsmede tinnen, waarvan echter die van kunstig gegoten worden, alsmede tinnen, waarvan echter die van kunstig gegoten worden sterk loodhoudend zijn, daar zij van het solkand van petroleumblikken worden gemaakt, waarvan natuurlijk in het kan zijn, daar het buiten Europeeschen inted staat.

Onder de voorwerpen van huishoudelijken aard toonde de heer Weber de vergadering een zak die op den rug wordt gedragen, met een koperen spiraal als tegenwicht, alsmede verschillende kunstig bewerkt taschjes en manden met laadjes, voor berging der bestanddeelen benod digd bij het sirih-kauwen; hierbij gebruikt men ook kokers, waarin d kalk in poedervorm wordt bewaard. Als wapen dient een rechte klewang, die in het Rokka-gebied zonder scheede wordt gedragen; in Oor Flores heeft men een korter wapen; ook komen in het W. en in het centrale gedeelte, b. v. in het Rokka-gebied, nog boog en pijl voor benevens lans en schild van karbouwenhuid.

Geld wordt op Flores nagenoeg niet gebruikt; te Maumerie, Sikka e Endeh zijn zgn. "hoangs" of oude dubbeltjes gangbaar, alsmede rijk daalders en Engelsch goudgeld, liefst met een springend paard als sten pel. Kopergeld wordt niet aangenomen en in het Rokka-gebied kei men in het geheel geen geld buiten goud. De ruilhandel levert veel be zwaren op; den heer Weber had men geraden messen en blauwe korale mede te nemen. Deze laatste waren echter uit de mode, en naar messe was weinig vraag, daar er juist tijdens het verblijf van den heer Webe op Flores, niet geöogst werd. Spiegeltjes, lijnwaden en gekleurde stofen waren zeer in trek, maar ook van deze laatste moest men toevalli de juiste kleur hebben, die op een gegeven oogenblik, bijv. bij het kopen van levensmiddelen, door den verkooper verlangd werd, daar de koop anders mislukte. Tengevolge van al die bezwaren en van de onmegelijkheid om steeds voedsel te verkrijgen kon men dan ook niet ver he binnenland ingaan.

De godsdienst in Bima en Endeh is de Islam; in Maumerie en Sikk wonen Christenen; overigens is de bovolking Heidensch. Het is moeielij omtrent den laatstgenoemden godsdienst veel te vernemen; in Kottin vond men bijv. eigenaardige, zeer fraaie palen die door den reiziger Ji cobsen voor offerpalen worden aangezien, hetgeen echter waarschijnlij niet juist is. Den heer Weber werd medegedeeld dat die palen daar ware opgericht ter herinnering aan feesten en plechtige gelegenheden. De b snijdenis schijnt bij de bergstammen algemeen te zijn, maar zelfs de zei delingen weten niet nauwkeurig hoe zij geschiedt.

Het land zelf is buitengewoon schoon, met steile kusten en prachtig bergen, die op vele plaatsen tot aan zee reiken, zoodat het verkeer lang het strand zeer moeielijk is. De wegen zijn weinig talrijk en moeielij te begaan, op den weg van Maumerie naar Sikka moest men dertie maal over eene rivier. In het Westen schijnen zij iets beter te zijn.

Van Celebes besprak de heer Weber het landschap Loewoe, het min bekende aan de golf van Boni, dat vijf of zesmaal zoo groot is als Bon De radja schijnt echter geen gezag te hebben in het centrale gedeelte van zin gebied.

Men heeft hier ook weer de kustbevolking, de Towareh, die geheel met de Boegineezen in het Zuiden, overeenkomt en de bevoking van het bimenland, de Toradja's, in wier land de spreker korten tijd vertoefd bed en die eenigszins schuw zijn voor Europeanen. Zij wijken zeer af van de Boegineesche stammen en dragen geen hoofddoek, maar slechts een tow om het hoofd. Het eenige kleedingstuk der mannen, bestaande uit ene papierachtige stof van geklopte boomschors, wordt om de heupen geslagen en tusschen de beenen doorgehaald; komen zij ter markt, dan bebben zij ook een sarong aan. De vrouwen dragen ook die papierachtige stof en een sarong bestaande uit de vezels der jonge bladeren van de gebang-palm. De weinige sieraden bestaan uit koperen of ijzeren vingemingen en uit eenvoudige armbanden. De wapens wijken zeer in vorm st van die der Florineezen; zij hebben eigen klewangs; vroeger schijnen ook blaasroeren in gebruik te zijn geweest, met daarbij behoorende pijlis. Dit herinnert aan de toestanden op Borneo. Pijl en boog ontbreken geheel.

Het landschap Loewoe is zeer rijk aan natuurproducten en voert damar, rotan, sago en koffie uit, vooral naar Singapore en Pontianak. Voor het kloppen der sago wordt een eigenaardig werktuig gebruikt, ten sagohamer, welken de spreker aan de vergadering toonde, en die geheel afwijkt van degene welke, volgens Wallace, op de meer oostelijk gelegen eilanden en, volgens S. Hickson, op de Sangir- en Talaut-eilanden in gebruik zijn. Een groote palmboom, die eene waarde van f 5.— vertegenwoordigt, levert aan één man voedsel voor vele maanden. Geld is alleen in gebruik in het kustgebied en bestaat uit Hollandsche rijksdaalders en guldens, benevens een eigenaardig soort van kopergeld.

Centraal Celebes wijkt geheel af van het Zuiden des eilands; het laatste is slechts bergachtig aan de westkust; de oostzijde bestaat voor een groot gedeelte uit eene groote vlakte, waardoor de Tjenrana-rivier stroomt. Meer naar het Noorden heeft men het Latimoedjong-gebergte, en de verdere gebergten in het Centrale gedeelte. In Loewoe zelf, bij Palopo, komt het gebergte tot aan de kust, met hier en daar eene vlakte, welke skwijls bij vloed overstroomd wordt. Zoo staat bijv. de kampong Palopo, in zulk eene kustvlakte gelegen, bij vloed onder water; tijdens de eb loopt het water af, en dan is de bodem moerassig, zoodat de huizen op Palen gebouwd zijn. Een zonderlingen indruk maakt het wanneer men daar de kinderen in het water ziet spelen, zooals elders op het land.

Meer in het binnenland heeft men een hoog en steil gebergte me diepe ravijnen.

Daarmede besloot de spreker zijne boeiende voordracht, die opgehelder werd door verschillende uit Flores en Celebes medegebrachte voorwerpe van kleeding, huisraad enz. alsmede door prachtig uitgevoerde plate welke in het, door den heer Weber uit te geven verslag over zijne ethne graphische verzameling, zullen worden opgenomen 1).

De heer Quarles van Ufford vroeg welke de voornaamste producten van Flores zijn, of er ook sawah's gevonden worden en of het Christendom nog al vorderingen maakt?

De heer Weber noemde als voortbrengselen, in de eerste plaats mal en verder rijst, die in verschillende streken ook op sawah's verbouw wordt; in Endeh spelen klappers eene groote rol in de volksvoeding. Me de bevolking van het Rokka-gebied wordt ook handel gedreven, maar d kustbewoners vreezen haar toch eenigszins, vooreerst omdat die bevolking vreemdelingen, ook Europeanen, tracht te weren en ten andere omda de kustbewoners zelven geen zuiver geweten hebben, daar zij somtijd Rokkaneezen als slaven meevoeren en dus beducht zijn voor weerwraak De Katholieke zendelingen hebben in Sikka en Maumerie veel bekeer lingen gemaakt, die de kerk trouw bezoeken; toch staan zij somtijds 221 gevaren bloot, zooals gebleken is uit de poging der bergbewoners on pastoor Le Cocq d'Armanville te vermoorden. Dat er zoo lang droogte was geweest, diende als voorwendsel; er moest iemand zijn die daaraat schuld had en de hoofden der bergstammen wisten hun volk tegen ge noemden pastoor en den Radja van Sikka op te hitsen, die belang zou den hebben bij droog weder voor den bouw der kerk te Sikka. De hoof den zelven wilden zich op die wijze wreken voor de vermindering val hun - overigens nadeeligen - invloed.

De heer Levyssohn Norman vroeg of hij uit de voorstelling welkt de heer Weber had gegeven van de vervaardiging van tinnen ringen uit petroleumbussen, moest afleiden dat de spreker de aanwezigheid van tit op Flores betwijfelt? Deze vraag werd door den heer Weber ontkennend beantwoord; de bovenbedoelde vervaardiging van tinnen voorwerpen gold alleen voor Sikka en Maumerie en speelde slechts een ondergeschikte rol, aangehaald alleen als voorbeeld waarop een reiziger verdacht moest zijn. In het Rokka-gebied had hij echt tinnen voorwerpen gezien. Overigens had hij hierover geen oordeel.

¹⁾ Internat. Archiv. f. Ethnographie. III. Supplement. 1890.

De Voorzitter vroeg waarom de voortbrengselen uit Loewoe naar Pontianak en niet naar Makassar worden uitgevoerd en of dat komt doordat de handel gedreven wordt door Arabieren?, waarop de heer Weber mide dat zulks inderdaad het geval is en dat er wel koffie en andere producten ook naar Makassar worden uitgevoerd.

Na hartelijke dankbetuiging aan den heer Weber, voor zijne belangike mededeelingen, vroeg de Voorzitter of nog een der aanwezigen het word verlangde, waarop de heer Dr. H. Blink zijn verlangen te kenen gaf om eene beknopte mededeeling te doen betreffende de verschijnulen van erosie in de Lauwerszee, gedurende de laatste honderd jaren. De spreker wees er op dat de kunstwerken, door den mensch langs kusten aangelegd, op enkele plaatsen een merkwaardigen invloed op te erosie gehad hebben, hetgeen blijkt wanneer men oudere kaarten met tegenwoordige vergelijkt. In de vorige eeuw was er in het midden van den ingang der Lauwerszee een diepe geul, die van het N. naar het L liep, met eene voortzetting naar het O., nl. naar het Reitdiep, en eene naar het W., tot Dokkum, dat toen eene zeestad was, waar eb en vloed zich deden gevoelen. Er waren dus twee stroomingen, eene uit het 0. en eene uit het W., tusschen welke zich, in het Z., eene plaats van stistand bevond. De kracht der oostelijke strooming moet het grootst geweest zijn. Tegenwoordig is de noordelijke middengeul, meer naar het W. verplaatst

Oostmahorn ligt, sedert ca. 1730, aan de diepte; de geul bij het Dokkumerdiep bestaat nu niet meer, buiten de tegenwoordige sluis is er slechts een kleine geul van achtergebleven. De stroom in het O. is versmald, maar bestaat nog wel. De eb- en vloedstrooming drong vroeger met 1,20 m. verschil, met kracht uit de zeegaten en stuitte op het zuidelijk gedeelte der Lauwerszee, maar naar het W. (Dokkum) en het O. (Reitdiep) had men krachtige stroomen, van welke de laatste de sterkste was. In 1730 werd het Dokkumerdiep geheel afgesloten, terwijl het Reitdiep (tot 1876) open bleef; het water drong van toen af dus alleen in het laatstgenoemde, terwijl het eerste dichtslibde en de geul daar bijna geheel verdween. De krachtige oostelijke strooming van het Reitdiep maakte dat de geul zich meer en meer naar het W. verplaatste en thans licht bij de Friesche kust ligt. Nu ook het Reitdiep afgesloten is zullen de toestanden nog wel weer veranderen.

De Voorzitter betuigde den heer Blink zijn dank voor de gedane belangrijke mededeeling en gaf vervolgens het woord aan den Vice-Vooritter, Prof. C. M. Kan, die mededeelde dat zich tot deelneming aan het beraamde Zuidpoolonderzoek heeft aangeboden een Nederlandsch natuurhistoricus, welke ook indertijd den tocht met de "Varna" heeft medegemaakt.

Spreker heeft reeds vroeger, op het tweede Nederlandsch Natuur- er Geneeskundig Congres ¹), het belang van het onderzoek der Zuidpool gewesten, ook voor de maritieme geographie van onzen Oost-Indischer Archipel, uiteengezet. Zeker is het een heugelijk feit dat thans een Neder lander aan de door Nordenskjöld en Dickson ontworpen expeditie wi deelnemen en spreker vermeent dat het ongetwijfeld zijn nut kan hebber indien deze vergadering bij acclamatie van hare instemming daarmede doet blijken. Van wege het Bestuur zal aan den bedoelden natuuronder zoeker een schrijven van aanbeveling bij de heeren Nordenskjöld er Dickson worden terhand gesteld.

De vergadering gaf hare levendige instemming met die woorden te kennen, waarop de Voorzitter, onder dankbetuiging aan de aanwezigen voor de betoonde belangstelling, de vergadering sloot.

¹⁾ Zie "Handelingen" van dat Congres, p. 236 vlg. en het Tijdschrift van ons Genootschap, 1889, M. p. 465.

VERSLAG van den Secretaris betreffende den toestand æ de verrichtingen des Genootschaps over het afgeloopen jaar (April 1889—April 1890).

Geachte Medeleden!

Namens het Bestuur heb ik de eer u het volgende verslag aan te bieden, betreffende den toestand en de verrichtingen des Genootschaps om het afgeloopen jaar.

a. Leden.

Ter vergadering van 20 April 1889 werden tot bestuursleden gekozen de heeren Mr. C. J. E. graaf van Bylandt, J. IJzerman, A. W. van Eeghen (herkozen), Dr. H. C. Rogge (herkozen), G. Rosenthal, Dr. J. Loné, J. R. Wuste, Prof. Dr. M. J. de Goeje, C. Bosscher en P. A. van Buuren, welke zich bereid verklaarden zitting te nemen in het Bestuur, met uitzondering van de heeren Bosscher en Rosenthal, eerstgewoorde om gezondheidsredenen, de laatste wegens zijne vele bezigheden. Er zijn dus twee vacatures blijven bestaan.

Het aantal contribueerende leden en donateurs bedroeg op I Januari 1889, 707, waarbij in den loop des jaars zijn gekomen 34 nieuwe leden, terwijl er zijn afgegaan, door bedanken 30, door overlijden 16, door bemoeming tot eerelid I en geroyeerd 2, totaal 49.

Op 1 Januari van dit jaar telde het Genootschap dus 692 leden en heeft het derhalve een verlies geleden van 15 leden.

b. Voordrachten.

In den afgeloopen winter hebben er, om verschillende redenen, geen roordrachten plaats gehad; de heer S. J. Dutoit, die dezen winter eenisten tijd in ons land vertoefd heeft, had aan den Voorzitter beloofd voor het Genootschap eene voordracht over Zuid-Afrika te zullen houden, maar hij heeft tot dusver niets van zich laten hooren.

c. Bijeenkomsten en Congressen.

Het Genootschap is, op het in Augustus van het vorige jaar te Parijs gehouden internationaal geographisch congres, vertegenwoordigd door de keren Prof. Dr. C. M. Kan, Vice-voorzitter en J. Æ. C. A. Timmerman,

Secretaris des Genootschaps. Het door de beide afgevaardigden uitgebrack verslag is opgenomen in den vorigen jaargang van het tijdschrift, Af Verslagen en Mededeelingen, pag. 600 vlg.

d. Publication.

Behalve het tijdschrift is ten vorigen jare door het Genootschap gept bliceerd het 3de deel der Algemeene Aardrijkskundige Bibliographie va Nederland. Evenals in de beide vorige jaarverslagen wordt ook hier, i eene noot, een beknopt overzicht van den inhoud van den vorigen jaar gang gegeven, ten behoeve van hen die, geen lid des Genootschaps zijnde dit verslag in handen mochten krijgen 1).

- 1) a. Afdeeling Meer Uitgebreide Artikelen:
 - 1. Atjeh's Weatkust (Vervolg en Slot), door K. F. H. van Langen.
 - Engano, zijne geschiedenis, bewoners en voortbrengselen, door Dr. C. A. Oude mans Jzn.
- 8. Een woord bij de kaart van Samarang, door H. Ph. Th. Witkamp.
- 4. De plannen tot droogmaking der Zuiderzee, door P. A. van Buuren.
- Reis van de Oostenrijksche Korvet "Zrinyi" naar West-Indië (met Naschrift) door Jhr. Mr. J. K. W. Quarles van Ufford.
- Verbeteringen en aanvullingen van »Reizen en Onderzoekingen in Noord-Amerika", door Dr. H. F. C. ten Kate Jr.
- Eenige bemerkingen betreffende de Zoogdieren, besproken door den Heer R Schuiling in »de Grenslijn van Wallace, eene continentale Grens", door F A. Jentink.
- De ontwikkeling onzer kennis van het Pamir-Gebied, door J. Æ. C. A. Tim merman.
- 9. Een Nederlandsch reiziger aan den Congo, door F. de Bas.
- 10. De Samos-eilanden, door W. F. Andriessen.
 - b. Afdeeling Verslagen en aardrijkskundige mededeelingen:
- Het eiland Urk, benevens eenige algemeene beschouwingen over de geologie van Nederland, door K. Martin.
- 2. Eenige opmerkingen naar aanleiding daarvan, door Dr. J. Lorié.
- 3. Een antwoord aan Dr. J. Lorié, van K. Martin.
- 4. Nederlands gemeenten boven 10.000 inwoners enz., door J. F. Hoekstra.
- Nogmaals de grens tusschen het gebied van Nederland en dat der North Bornet Company, door W. F. Versteeg.
- 6. Een nieuw werk over China, door F. G. Kramp.
- 7. De verbinding van de Amoe-darja met de Kaspische Zee, door F. G. Kramp.
- 8. Eenige bijzonderheden betreffende de Mongolen, naar N. M. Przjewalski.
- De belangrijkste reisen der Nederlanders, in de 19e eeuw ondernomen. De voornaamste werken, in dat tijdperk op geographisch gebied verschenen, door Prof. Dr. C. M. Kan.

Het Bestuur acht zich gelukkig dat de bibliographie van Nederiand voltooid is, want aanvankelijk schenen de bezwaren, welke vooral van gedelijken aard waren, het werk onmogelijk te zullen maken. Zoowel an de afdeeling "Nederland", in den persoon van haren voorzitter, als an de medewerkers aan de bibliographie is de dank des Bestuurs besigd voor hetgeen door hen verricht is om het werk tot een goed einde te brengen. (Zie ook tijdschrift 1888. Verslageu en Meded. p. 179, en 1899, p. 431).

Wat het proces met den heer Brinkman (p. 433 vorigen jaargang) angaat, dit is nog op verre na niet geëindigd. De pleidooien te dier ande zijn gehouden op 3 Mei van het vorige jaar; daarop volgde de nispraak der arondissements-rechtbank, op 25 Mei, volgens welke het Genotschap in het gelijk werd gesteld, maar aan het Bestuur een supplemire eed werd opgelegd. Den dag voordat zulks zou geschieden werd ether door de tegenpartij appèl aangeteekend, zoodat de zaak nu sinds 17 Juni, in tweede instantie wordt behandeld. De advokaat des Genootschaps heeft onlangs medegedeeld dat de pleidooien voor het Gerechtshof milen plaats hebben op 24 October a.s.!

^{10.} Near de Talant-eilanden, door F. A. Ebbinge Wubben.

^{11.} Eruptie van den G. Tandikat op Sumatra, door K. Martin.

Mededeelingen aangaande het wetenschappelijk onderzoek der Key-eilanden en van het eiland Flores.

Brief van Van der Kellen over Gambos en zijne bewoners, medegedeeld door P. J. Veth.

Iets over het Indiaansche vraagstuk in de Vereenigde Staten, door Dr. H. F. C. ten Kate Jr.

^{15.} Eenige mededeelingen omtrent de Hemenway-expeditie, door Dr. H. F. C. ten Kate Jr.

^{16.} De invloed der wouden op den waterstand der rivieren en beken van Midden-Europa, door F. E. L. Veeren.

^{17.} Het hooger onderwijs in aardrijkskunde hier te lande, door Prof. Dr. C. M. Kan.

De vermeerdering der kennis van den sardbol, gedurende het jaar 1888, door J. Æ. C. A. Timmerman.

^{19.} Necrologie, door denzelfden.

De afdeeling geologie en physische geographie van het tweede natuur- en geneeskundig congres, door denzelfden.

Het geographisch congres te Parijs. Verslag der beide afgevaardigden des Genootschaps.

^{22.} Boekbesprekingen enz.

^{22.} Bibliographie van tijdschriftartikelen, door Dr. H. C. Rogge.

^{14.} Nomina Geographica Neerlandica.

Bedenkt men dat het geschil ontstaan is in het laatst van het jaar 188 dan behoeft men zich niet te verwonderen over de klachten die enke malen worden aangeheven over de langzaamheid onzer rechtspraak.

c. Geschenken aan het Genootschap.

Deze hebben bestaan in boek- en kaartwerken en in geld; de volledig opgaven ervan zijn te vinden in de verslagen der Bibliothecarissen ovan den Penningmeester. Het Bestuur brengt hierbij zijn dank toe as de velen die van hunne belangstelling in het Genootschap deden blijke

f. Betrekkingen en briefwisseling met de regeering en met andere genootschappen.

Ter gelegenheid van den gedenkdag der veertigjarige regeering van onzen Koning heeft het Bestuur aan Zijne Majesteit de eerbiedige gelul wenschen des Genootschps aangeboden.

Zoo ook meende het Bestuur niet achterwege te mogen blijven toe het gold een bewijs van belangstelling te geven aan een der med oprichters van ons Genootschap, den heer J. Kuyper te 's Gravenhage bij gelegenheid van den gedenkdag zijner 50-jarige ambtsvervulling Namens het Genootschap werd hem door eene commissie, bestaand uit de bestuursleden Jhr. Mr. J. K. W. Quarles van Ufford en Mr. (J. E. graaf van Bylandt, welke volgaarne die taak op zich hadden genomen, een schrijven ter hand gesteld, waarin het Bestuur hem zijn gelukwenschen aanbood en daarbij zijne waardeering uitsprak over he geen door hem in het belang van het Genootschap gedaan is.

Behalve van de briefwisseling met de regeering over de expeditus de Genootschaps in Indie, — waarover straks nader — valt hier meldin te maken van een in Juni 1889 aan den Koning gezonden adres, waar het Bestuur zijne instemming betuigt met de denkbeelden over het hoog onderwijs in aardrijkskunde hier te lande, ontwikkeld door een twintigt geografen, in een schrijven aan den Minister van Binnenl. Zaken van Me Beide stukken gaan als bijlagen (A en B) bij dit verslag. Tot dusverd door het Bestuur nog geen antwoord op dat adres ontvangen.

Verder ontving het Bestuur een schrijven, dd. 25 April 1889, van hoogleeraar Dr. C. B. Spruyt, Secretaris van het Bureau der Nederlands Zuid-Afrikaansche Vereeniging, welk schrijven als bijlage C bij dit versis opgenomen, evenals het antwoord van den Secretaris, namens het stuur, dd. 24 Juni 1889 (Bijlage D).

Het Bestuur der Nederlandsch-Zuid-Afrikaansche Vereeniging was er

l van meening dat de voor het wetenschappelijk onderzoek van de basvaalsche. Republiek benoodigde gelden in Nederland gevonden moesworden, maar aangezien het Bestuur van ons Genootschap het niet uschijnlijk achtte dat zulks gelukken zou, werd er, na eenige gedachtenseling, overeengekomen dat men zou trachten een onderhoud te veren met den heer S. J. Dutoit, bij diens komst in ons land. Dat onbood heeft inderdaad plaats gehad; de heer Dutoit stelde blijkbaar belang in het beraamde onderzoek en verzocht dat het plan op ist zou worden gesteld en aan hem worden ingediend, opdat hij het, zijn terugkeer in de Transvaal, bij de regeering zou kunnen aanben. Inmiddels was de Vice-voorzitter des Genootschaps, Prof. C. M. Kan, deze zaak in overleg getreden met Dr. G. A. F. Molengraaff, die bereid verklaarde — onder nader te bepalen voorwaarden — het ogisch onderzoek der Transvaal op zich te nemen, en die, op eene toe van wege het Bestuur gedane uitnoodiging, een voorloopig rapdaarover samenstelde. Ter volledige Bestuursvergadering van 15 Sept. werd besloten dat rapport, met een door den Voorzitter ter tafel acht voorstel (zie bijlage E), rechtstreeks aan de Transvaalsche regeete zenden, in afwachting dat aan den heer Dutoit - die zich in het enland bevond — na zijn terugkeer hier te lande, afschriften van die ken ter hand gesteld zouden kunnen worden, met verzoek zijn invloed de regeering der Transvaal aan te wenden om aan het voorstel kans slagen te verzekeren. Het rapport van den heer Molengraaff zal, eenige wijziging, als afzonderlijk artikel in ons tijdschrift worden enomen.

In het vorige jaarverslag (p. 435) werd medegedeeld dat de heer M. J. A. K. Horstink door het Bestuur benoemd was tot vertegenwoordiger is Genootschaps in de Transvaalsche Republiek; kort daarna echter transm het Bestuur dat genoemde heer overleden was en werd besloten in heer J. J. C. Leyds, die eveneens veel belangstelling in het Genoothap betoond heeft (zie o. a. de rekening van den Penningmeester), te troeken in plaats van wijlen den heer Horstink, het Genootschap in nieuw vaderland te willen vertegenwoordigen. Het Bestuur twijfelt ist of de heer Leyds zal gaarne de behartiging van de belangen des Genootschaps op zich willen nemen.

Van Dr. H. Blink ontving het Bestuur een schrijven dd. 17 Sept. 1889

Fer de oprichting van een centraalbureau voor geologische en geogra
hische onderzoekingen in Nederland (Bijlage F). Ter volledige Bestuurs
regadering van 28 Sept. werd daarop eene commissie benoemd, bestaande

uit de heeren Prof. Dr. K. Martin als voorzitter, Prof. Dr. C. M. Kai Dr. J. Lorié, J. Kuyper, Dr. G. A. F. Molengraaff, J. W. Welcke A. A. Beekman en Dr. H. Blink als secretaris. Daar de heer Martin wegens zijne vele bezigheden, voor de benoeming bedankte, werd h voorzitterschap der commissie door den heer Kan waargenomen. Het we slag door de commissie uitgebracht wordt als bijlage G hierbij gevoegd

g. Wetenschappelijk onderzoek van Nederlandsch Oost-Indië.

Over het onderzoek der Kei-eilanden valt het volgende mede te deele De heer C. J. M. Wertheim is in het vorige jaar in Nederland terugg keerd en heeft eene, door hem op de verschillende eilanden der Ke groep gemaakte verzameling van gesteenten aan het Bestuur aangebode hetwelk ze aan het Rijksmuseum voor geologie te Leiden heeft afgestaat Door den hoogleeraar Dr. K. Martin is, naar aanleiding daarvan en we eenige door Prof. Dr. H. Wichmann uit Indië medegebrachte gesteente eene verhandeling geschreven, welke in het eerste nummer van deze jaargang van ons tijdschrift is opgenomen. De heer Wertheim heeft we der de toezegging gedaan dat hij zijn verslag binnenkort, ter opnemis in het tijdschrift, aan het Bestuur zal doen toekomen. Men zie ook 1 493 vlg. van den vorigen jaargang van ons Tijdschrift. Versl. en Med.

De luitenant ter zee H. O. W. Planten is nog steeds bezig met zijn hydrographische opnemingen en hoopt deze geheel voltooid te zulle krijgen. De als bijlagen H, J, K, L en M hierachter opgenomen brieve zijn van hem ontvangen na dien van 6 April 1889 (zie vorigen jaargan van ons tijdschrift, Versl. en Meded. p. 500). Het Bestuur heeft den het Planten geschreven dat het zijn ijver en dien van den stuurman A. Bu zeer waardeert, en dat de tot dusver gezonden verslagen der meteorolog sche waarnemingen bewerkt zullen worden, zoodra de instrumenten t Batavia door den heer Planten zullen zijn geverifieerd.

Ook heeft het Bestuur brieven van dankbetuiging gezonden aan de heer B. H. van Gorcum, gezagvoerder van het stoomschip, Amboinadd. I Juli 1889, wegens de vele en belangrijke diensten door hem ge heel belangeloos aan den heer Planten, bij diens opnemingswerk, bewezen; aan den heer Ad. Langen, dd. 9 Sept. '89, door wiens steun de voltooiing van den arbeid mogelijk gemaakt wordt; aan den schout binacht P. ten Bosch, commandant der zeemacht in Nederlandsch Oost Indie, voor de hoog gewaardeerde welwillendheid, waarmede hij indertijk het Genootschap behulpzaam is geweest in het vinden van een geschikt zee-officier, die geneigd was de taak der opneming van de Kei-eilanden

annuarden; aan den heer H. L. Worms, civiel-gezaghebber te Laletteka, dd. 28 Febr. 1890, voor de hulp en de ondersteuning door an den heer R. van den Broek, bij diens werkzaamheden op Flobewezen: alsmede aan de Directie der Nederlandsch-Indihe Stoomvaartmaatschappij, dd. 8 Maart 1889, welke zoo wellend is geweest den heer Van den Broek eene belangrijke reductie toe stan op de overtochtsgelden, voor zooverre door hem van de booten maatschappij gebruik werd gemaakt. Wat het onderzoek van het nd Flores aangaat, is het den leden bekend dat de hoogleeraar Dr. Wichmann, in Juli van het vorige jaar, van zijne reis is teruggekeerd pag. 49s Versl. en Meded. vorigen jaargang); het door hem in te sen wetenschappelijk verslag zal in het tijdschrift worden opgenomen. Van den heer Van den Broek (zie p. 492 Versl. en Meded. vorigen gang), ontving het Bestuur brieven dd. 5 en 29 Juli, 13 Augustus, n 29 November 1889 en 5 Januari 1890, waaruit bleek dat hij in zijn eid belemmerd werd door slecht weder, moeielijk terrein en gebrek werkvolk. Hij heest, van uit Larantoeka als uitgangspunt, telkens grooen kleinere tochten in het oostelijk gedeelte des eilands gedaan en rbij gelegenheid gehad talrijke fouten op de bestaande kaarten te vereren.

In zijn schrijven van 29 Juli geeft hij, — naar aanleiding van een tocht r Conga, in gezelschap van een der pastoors uit Larantoeka, — eenige ichten aangaande de zending op Flores, alsmede eene korte levensberijving van een der zendelingen, Petrus Bonnike genaamd, die ten igen jare omkwam. De brief van 13 Augustus bevat het verhaal eener timming van den Ilimandiri; bij dien van 5 November is een reisstag gevoegd betreffende een tocht naar Sikka (Bijlage N).

De verdere brieven hebben hoofdzakelijk betrekking op den aard der tzaamheden van den heer Van den Broek, over het algemeen genon, en op zijne plannen voor het volgende jaar. Hij heeft nl. aan het tuur doen weten dat hij met het eind van het jaar 1889 van zijne beking tot het Genootschap wenschte af te zien, maar dat hij gedurende eerste maanden van het jaar 1890 nog werkzaam zou blijven, ten de zijn arbeid nog hier en daar aan te vullen. Aan zijn voornemen met den mijningenieur Van Schelle mede te gaan naar de tinstreken hij geen gevolg geven, daar die expeditie slechts een zeer vluchtig akter zou dragen en de regeering, met het oog daarop, wenschte dat begeleidend personeel zoo gering in aantal zoude zijn als mogelijk. Mocht tengevolge van dat onderzoek later een meer uitgebreid plaats

hebben, dan zou den vertegenwoordiger van het Genootschap gaarne vergunning worden verleend de expeditie te begeleiden. — Uit hetgeen leter betreffenden den ongunstigen afloop van den tocht des heeren Var Schelle bekend is geworden, valt wel af te leiden dat er vooreerst ni veel zal komen van een onderzoek der binnenlanden van Flores.

De onderhandelingen met Dr. H. F. C. ten Kate (zie p. 441 vor jaarverslag), hebben wel is waar tot het resultaat geleid dat hij zich b reid verklaard heeft, op de vroeger omschreven voorwaarden naar Flor te vertrekken; maar aangezien de subsidie van f 10,000 voor dit jaar n niet aan het Genootschap is toegekend, is het nog zeer twijfelachtig bovenbedoelde reis van den heer Ten Kate wel zal plaats hebben.

Omtrent de genoemde subsidie is op dit oogenblik niets bepaalds met te deelen; het Bestuur is sinds vele maanden daarover met de regeerii in briefwisseling en stelt zich voor later alle stukken, welke op die zat betrekking hebben, in het tijdschrift op te nemen. Zoolang echter (eindbeslissing niet bekend is acht het Bestuur daartoe het oogenblik no niet gekomen 1).

Het Bestuur acht het niet overbodig allen, die werkelijk belang stellen in des werkzaamheden des Genootschaps, aan te bevelen die mededeelingen eens nam keurig na te lezen, met het oog ook op hetgeen daaromtrent later gepublicest zal worden.

¹⁾ Men vindt in de vorige jaargangen van ons tijdschrift, in de afdeeling "Verstigen en Mededeelingen", uitvoerige mededeelingen aangaande alles wat op de expedit naar de Kei-eilanden en naar het eiland Flores betrekking heeft, met name de voobereiding daarvan. Voor het onderzoek der Kei-eilanden raadplege men: jaargan 1887, p. 577 vlg.; 1888, p. 5, 186—191 en 260; 1889, p. 81 vlg., 213, 436—438 e 493 vlg.; voor de expeditie naar Flores: jaargang 1888, p. 191 en 193 vlg.; 1881 p. 438—447, enz.

AMSTERDAM, Mei 1889.

Aan Z. E. den Minister van Binnenlandsche Zaken.

Het is de volgende zaak, welke ondergeteekenden de vrijheid doet zemen dit schrijven tot Uwe Excellentie te richten.

Ter vergadering van de 4e sectie van het Natuur- en Geneeskundig Congres, in October 1887 te Amsterdam gehouden, werd het denkbeeld ter sprake gebracht, in een afzonderlijke bijeenkomst van geographen, over de wetenschappelijke beoefening der aardrijkskunde hier te lande en, in verband daarmede, over de voorbereiding tot die beoefening en haar studie aan de universiteit, van gedachten te wisselen.

Naar aanleiding daarvan vormde zich een comité, bestaande uit vertegenwoordigers van verschillende takken van onderwijs in die wetenschap, de HH: Dr. C. M. KAN, Hoogleeraar aan de Gemeente Universiteit te Amsterdam; P. R. Bos, Leeraar aan de Rijks Hoogere Burgerschool te Groningen; J. Æ. C. A. TIMMERMAN, Leeraar aan het Gymnasium te Amsterdam en C. Abels, Leeraar aan de Kweekschool voor Onderwijzers en Onderwijzeressen te Amsterdam.

Dat comité besloot, in de eerste plaats de bespreking van het Hooger Onderwijs in aardrijkskunde aan de orde te stellen, dewijl van een goede regeling van dezen tak van onderwijs de meeste invloed kon uitgaan op de beoefening der aardrijskunde als wetenschap en het onderwijs in dat bervak, terwijl daarvan tevens verbetering in de opleiding van leeraren en de vorming van ontdekkingsreizigers of natuuronderzoekers in onze kolonien kon verwacht worden.

Het comité riep, bij gelegenheid van het 20 Natuur- en Geneeskundig Congres, 't welk onlangs te Leiden werd gehouden, die afzonderlijke bijeenkomst van aardrijkskundigen bijeen, waarop toen, zoowel de richting in de studie der aardrijkskunde als de vorming en voorbereiding der beoefenaars dier wetenschap, aan een uitvoerige discussie werden ondervorpen.

Ten slotte werden met algemeene stemmen de volgende stellingen aangenomen:

L De dualistische richting in de beoefening der aardrijkskunde is wenschelijk, zoowel met oog op die wetenschap zelve als op den stand harer beoefening hier te lande en het onderwijs in dat leervak op het Gymnasium of op de Hoogere Burgerschool.

- II. Met het oog op de goede beoefening dier wetenschap is de vorming der geographen aan eene Universiteit, voorafgegaan door een voor bereiding op het Gymnasium of op de Hoogere Burgerschool, als mede de aanstelling van afzonderlijke hoogleeraren in aardrijks kunde aan één of meer Rijks-Universiteiten noodzakelijk.
- III. Bij de vorming dier geographen is een speciale geophysische oplei ding noodzakelijk, terwijl daarnaast land- en volkenkunde, geschie denis, staatswetenschappen en statistiek dienen beoefend te worden
- IV. De regeling der betere opleiding van geographen hier te lande za tevens kunnen voorzien in de behoefte aan goed gevormde natuu onderzoekers voor onze koloniën.

Daar tevens besloten werd, deze stellingen met de gewenschte toelich ting ter kennis Uwer Excellentie te brengen, nemen ondergeteekender nog de vrijheid, beleefdelijk Uwe aandacht op het navolgende te vestigen

Men achtte de dualistische richting in de beoesening der aardrijkskunde m. a. w. de studie van den aardbol en zijne verschijnselen (geophysiek) naast die van den aardbol en zijne bewoners in hun wederkeerigen in vloed op elkander (historische geographie), dáárom voor die wetenschapzelve wenschelijk, dewijl zij, aldus opgevat, een zelfstandige plaats tus schen de physische en de historische wetenschappen kan innemen en op eene universiteit te huis behoort;

men achtte die richting met het oog op den stand der beoefening van de aardrijkskunde hier te lande wenschelijk, dewijl die wetenschap, hie eerst sedert kort weder ernstig bestudeerd, zoowel in geophysische als it historische richting tot hooger niveau dient gebracht te worden;

men achtte eindelijk die dualistische richting in het belang van he onderwijs in dat leervak, dewijl de leeraar op het Gymnasium of de Hoogere Burgerschool zoowel in de land- als in de volkenkunde onder wijs heeft te geven en op het verband, dat tusschen beiden bestaat, tel kens heeft te wijzen.

Dat zulk een breedere beoefening der aardrijkskunde slechts aan een universiteit kan plaats hebben, behoeft zeker geen nadere toelichting slechts hierop zij het vergund nog nadrukkelijk te wijzen, dat de meest der onderteekenaars, uit gemis aan eene gelegenheid tot dergelijke voor bereiding, bij hunne studiën zich zelven den weg hadden moeten baner en levendig de nadeelen gevoelden, welke daaruit voortvloeiden.

Zal deze universitaire opleiding echter vrucht dragen, dan dient de beoefenaar, behoorlijk voorbereid, die universitaire lessen te volgen, en zal voorts niet enkel te Amsterdam gelegenheid daartoe moeten bestaan. Sechts door de aanstelling van afzonderlijke hoogleeraren in aardrijkskmde aan ééne of meer der Rijks-Universiteiten zal in die behoefte kunmen worden voorzien, terwijl daardoor tevens een betere regeling der examina en een billijker verleenen van het jus docendi in dat leervak kan tot stand komen dan thans het geval is.

Werden in de derde stelling, met het oog op de dualistische richting in de beoefening, zoowel een geophysische als een historische opleiding wrlangd, men bezigde daar de woorden "speciale geophysische opleiding", dewijl de kennis der natuurwetenschappen, ook wanneer zij naast en in wrband met de historische, zooals dit door den geograaf geschiedt, worden beoefend — toch door meer afzonderlijke studiën, volgens een strenger methode moet verkregen worden dan in vroegere dagen; en voorts ook daarom, dewijl slechts van zoo gevormde geographen als natuuronderzoekers, gelijk die in stelling IV verlangd worden, kon worden gebruik gemaakt. —

Tot zoover de stellingen.

Werden in die resoluties slechts zeer algemeene beginselen, wat betreft de beoefening der aardrijkskunde, de vorming der geographen en natuuronderzoekers, alsmede hun opleiding aan de universiteit uitgesproken, de vergadering onthield zich met opzet van bespreking der andere détails, dewijl zij van meening was, dat, zoo later, bij eventueele wijziging der wetten op het Hooger en Middelbaar Onderwijs en der acte-examens Middelbaar Onderwijs, de vorming en opleiding der geographen, naast die van beoefenaars der geschiedenis en der nieuwe talen, zou ter sprake komen, de regeling dier universitaire studien en examina toch moeilijk zou kunnen plaats hebben, zonder dat in dezen de belanghebbende faculteiten werden gehoord, op wier weg het dan zou liggen de bijzonderheden dier regeling nader te overwegen.

Op den weg der hier vergaderde geographen lag het slechts, met bescheidenheid de aandacht Uwer Excellentie te vestigen op den zeer onvoldenden toestand, waarin thans de beoefening der aardrijkskunde en het Hooger Onderwijs in dat leervak hier te lande verkeeren: een toestand, die niet enkel ongunstig terugwerkt op het onderwijs in aardrijkskunde op Gymnasium en Hoogere Burgerschool, maar ook op het wetenschappelijk onderzoek onzer koloniën.

Zal Nederland, welks naam vroeger zoo dikwijls roemvol in de geschiedenis der aardrijkskunde vermeld wordt, in dezen ook slechts eenigszins gelijken tred houden met andere beschaafde natiën van Europa, dan dent ook aan de Nederlandsche Rijks-Universiteit die wetenschap verte-

genwoordigd te zijn, en mag aldaar niet langer het jus docendi wegge schonken worden aan hen, die van deze wetenschap slechts zeer weini studie hebben gemaakt en daarin geen universitair examen aflegden. D gebrekkige beoefening dier wetenschap hier te lande moet ten slotte ool ongunstig werken op vele middelen van volksbestaan, wier ontwikkeling vooral bij een handeldrijvende, zeevarende en koloniale mogendheid nauw samenhangt met grondig onderwijs in aardrijkskunde en de bree opgevatte studien van den aardbol en zijne bewoners.

Alle redenen, waarom ondergeteekenden zich ten slotte tot Uwe Excel lentie wenden met bescheiden maar dringend verzoek, bij eene even tueele wijziging der Wetten op het Hooger en Middelbaar Onderwijs et de regeling der examina, die maatregelen te willen nemen, welke er to zullen kunnen leiden: in de behoefte aan goed gevormde leeraren it aardrijkskunde op Gymnasia en Hoogere Burgerscholen te voorzien; de aanstelling van afzonderlijke hoogleeraren in aardrijkskunde aan ééne omeer der Rijks-Universiteiten tot stand te brengen; in de regeling de universitaire studien en examina in aardrijkskunde aan de Nederlandsche Hoogescholen te voorzien, en de vorming van ontdekkingsreizigers en natuuronderzoekers in onze koloniën in de hand te werken.

Hetwelk doende,

•						
Dr. C. M. KAN,	Hoogleeraar aan de gemeentelijke Universiteit te Amsterdam.					
P. R. Bos,	Leeraar aan de Rijks Hoogere Burgerschool te Groningen.					
J. Æ. C. A. TIMMERMAN,	Leeraar aan het Gymnasium te Amsterdam.					
C. ABELS,	Leeraar aan de kweekschool voor Onderwijzers en Onderwijzeressen te Amsterdam.					
D. AITTON,	Leeraar aan het Gymnasium te 's Gravenhage.					
J. BAUMANN,	Leeraar aan de 2de Hoogere Burgerschool met 3-jarigen cursus te Amsterdam.					
Dr. H. BLINK,	Te Amsterdam.					
Dr. D. Bos,	Leeraar aan het Gymnasium te Winschoten.					
J. Branbergen,	Leeraar aan de Hoogere Burgerschool te Harlingen.					
J. J. H. Cornelisse,	Leeraar aan de 18te Hoogere Burgerschool met 3-jarigen cursus te Amsterdam.					
H. W. GROENEVELD,	Leeraar aan de 2de Hoogere Burgerschool met 3-jarigen cursus te Amsterdam.					
A. D. HAGEDOORN.	Leeraar aan de Hoogere Burgerschool met					

5-jarigen cursus te Amsterdam.

F. Hoekstra ,	Leeraar Apeldo		het	Middelba	ar Onderwijs	te		
Holwerda,				Hoogere te Rottere	Burgerschool dam.	met		
J. LEENDERTZ,	Leeraar a	an de	e Ho	ogere Burg	erschool te Leic	den.		
.A.E. van der Ley,	Leeraar aan de Rijkskweekschool voor Onderwijzers en aan het Gymnasium te Middelburg.							
F. Niermeyer,					nderwijs te Ho			
C. SEYL,	Leeraar Zierikz		de	Hoogere	Burgerschool	te		
R. W. F. VAN VLIET Jr.,	Leeraar	aan i	net C	Symnasium	te Delft.			
B. VAN DER WAL,	Leeraar Schied		de	Hoogere	Burgerschool	te		
Wesseling,	Leeraar Amers		de	Hoogere	Burgerschool	te		
IJzerman,	Leeraar Amste			Openbare	Handelsschool	l te		

ijlage B.

AMSTERDAM, Juni 1889.

Aan den Koning.

Geeft met den meesten eerbied te kennen het Bestuur van het Koninkk Nederlandsch Aardrijkskundig Genootschap te Amsterdam, dat het, van af de oprichting des Genootschaps, gemeend heeft de dangen van het Hooger Onderwijs in aardrijkskunde in ons land, te peten behartigen, gelijk, onder meer, hieruit blijkt dat die wetenschap, to vak van onderwijs, bijzonder van hooger onderwijs, reeds den 28sten bruari 1874, door den toenmalige Inspecteur van het Middelbaar Ontrwijs, nu wijlen Dr. D. J. Steyn Parvé, in eene te 's Gravenhage geluden vergadering des Genootschaps, werd besproken; terwijl het Belur, in Mei van dat jaar, zich tot Z. E. den Minister van Binnenlandhe Zaken richtte, met het verzoek in art. 20 van het toen aanhangige etsontwerp op het Hooger Onderwijs, de aardrijkskunde als zelfstange wetenschap afzonderlijk te noemen onder de vakken, voor welke erstoelen aan hoogescholen zouden worden opgericht, dat het Bestuur, toen aan het in bovenbedoeld verzoekschrift uitge-

drukte verlangen, bij de wet op het Hooger Onderwijs van het jaar 1876 niet was voldaan, zich tot den Raad der Gemeente Amsterdam wendde met verzoek aan de Universiteit aldaar een leerstoel voor aardrijkskund op te richten,

dat het Bestuur, hoewel aan laatstbedoeld verzoek werd voldaan, not tans vermeende, in het Tienjarig verslag der werkzaamheden en verrichtingen van het Aardrijkskundig Genootschap, in 1883 gepubliceerd, at dermaal met nadruk de aandacht te moeten vestigen op de regeling van het Hooger Onderwijs in aardrijkskunde en op de wenschelijkheid de oprichting van een leerstoel voor aardrijkskunde aan een of meer Rijksuniversiteiten, wijl daardoor alleen zou kunnen worden voorkomen, de aan de universiteit het jus doen di wordt verleend aan hen, die va aardrijkskunde weinig of in het geheel geen studie hebben gemaakt, gelijk thans het geval is, en daardoor alleen ook zou voorzien kunne worden in de behoefte aan goed voorbereide leeraren en natuuronde zoekers,

dat het Bestuur dan ook met de meeste belangstelling kennis hee genomen van de stappen nu laatstelijk door vertegenwoordigers van verschillende takken van onderwijs in die wetenschap gedaan, hierin be staande dat zij zich tot Z. E. den Minister van Binnenlandsche Zake gewend hebben, met eerbiedig verzoek, bij eventueele wijziging der wet ten op het Hooger en het Middelbaar Onderwijs, in de behoeften val het onderwijs in aardrijkskunde te voorzien en daardoor tot de weten schappelijke opleiding van leeraren in aardrijkskunde en de vorming val natuuronderzoekers voor onze koloniën mede te werken,

dat eindelijk het Bestuur voornoemd, gaarne aan het verlangen de onderteekenaars van bedoeld verzoekschrift wil voldoen, om van zijn instemming daarmede te doen blijken,

redenen waarom adressant zich met het eerbiedig verzoek tot Uwe Majes teit wendt, dat het Haar behagen moge, te willen voldoen aan het is bovenbedoeld verzoekschrift — waarvan hierbij een afdruk aan Uwe Majesteit wordt aangeboden — te kennen gegeven verlangen.

't Welk doende,

Het Bestuur van het K. N. Aardrijkskundig Genootschap.

(get.) W. F. VERSTEEG, Voorzitter.

(get). J. Æ. C. A. TIMMERMAN, Secretaris.

Bijlage C.

AMSTERDAM, 25 April 1889.

han het Bestuur van het Nederlandsch Aardrijkskundig Genootschap.

Namens het Bureau der Nederlandsch-Zuid-Afrikaansche Vereeniging heb ik de eer U het volgende ter overweging aan te bieden.

Bij ons is herhaaldelijk de vraag gerezen of niet een wetenschappelijke expeditie naar Zuid-Afrika uit Nederland wenschelijk is. Het laatst geschiedde dit naar aanleiding van een schrijven van ons medelid, Dr. Julius Mac-Leod, hoogleeraar in de plantkunde te Gent. Zulk eene expeditie zou heilzaam kunnen werken voor de belangen, die onze Vereeniging behartigt. Voor onze stamverwanten in de Zuid-Afrikaansche Republiek zou eene expeditie, die zich het onderzoek van den bodem en den plantengroei van hun land ten doel stelt, van groote waarde zijn. Wordt er bij de keuze harer leden op gelet, dat zij hart hebben voor de Boerenbevolking en vooral niet lijden aan de vooroordeelen, die de meeste Europeanen verhinderen den eigenaardigen volksgeest van het Afrikaner ras te waardeeren, dan zou die expeditie op dezelfde hartelijke ontvangst kunnen rekenen, welke in 1883 aan Dr. H. F. Jonkman ten deel gevallen is. Dan zou ook de persoonlijke invloed van de leden der expeditie ten goede komen aan het doel onzer Vereeniging.

Onze geldmiddelen zijn bij lange na niet voldoende om zelf zulk eene expeditie op het getouw te zetten. Maar Uw Genootschap, dat over ruimer middelen beschikt en welks werkkring meer beperkt is, kan daarin wellicht slagen.

Wel komt het nationaal doel, dat wij beoogen, bij U hoogstens slechts in de tweede plaats in aanmerking. Maar ook voor de aardrijkskundige vetenschap is een onderzoek der Zuid-Afrikaansche Republiek eene zaak van groote waarde. Wij zien niet in, waarom niet het wetenschappelijk en het vaderlandsch belang bij deze aangelegenheid door een en dezelfde onderneming zouden gediend kunnen worden. Het is zeker waar dat er en in onze kolonien en in Nederland zelf nog veel te onderzoeken valt, en dat Uw Genootschap tot dus verre schijnt gemeend te hebben zich daartoe te moeten bepalen. Doch beperking van arbeidsveld leidt niet in elk geval tot vermeerdering van kracht. Wij houden het voor niet onwaarschijnlijk dat Uw Genootschap op den duur aan arbeidskracht voor het onderzoek van Nederland en zijne Kolonien zou winnen, als

het thans eene ernstige poging deed om de Zuid-Afrikaansche Republiel beter bekend te doen worden.

Wanneer Uw Genootschap gezind mocht zijn de maatregelen te nemes tot voorbereiding der bedoelde expeditie, dan zijn wij bereid het Bestuu onzer Vereeniging uit te noodigen tot een voorstel aan de algemeen vergadering om, als blijk van belangstelling, een subsidie van f 2000 t geven. Wij twijfelen niet of het Bestuur en de leden zullen in dezemet ons medegaan, en kunnen U desverkiezende aangaande de gezind heid van het Bestuur spoedig meer zekerheid verschaffen, daar onze eerst volgende bestuursvergadering in Mei moet worden uitgeschreven.

Wij stellen op den voorgrond dat de toebereidselen voor de expeditie niet lang moeten duren. Juist thans bestaat er groote behoefte aan een onderzoek van den bodem, die behalve goud nog zoo veel andere be standdeelen van groote waarde schijnt te bevatten.

Voorts meenen wij dat zij bestaan moet, althans uit een aardkundige en een plantkundige. De aanwezigheid ook van dezen laatste is hoogs wenschelijk. De ontwouding van het zuidelijk, door blanken meer be volkt, gedeelte der Zuid-Afrikaansche Republiek, maakt den raad van een deskundige ten aanzien van de boschcultuur hoog noodig, terwijl vool de geschiktheid van het Noordelijk gedeelte voor het kweeken van verschillende tropische en subtropische gewassen weinig of geen onderzoekingen van deskundigen bestaan.

Eindelijk moet, naar onze meening, vooral rekening gehouden worden met de wenschelijkheid, dat het personeel der expeditie een gunstigen indruk maakt op de Transvaalsche bevolking. Door een treurige ondervinding gedurende vele tientallen van jaren is de Transvaalsche Boer zeer wantrouwend tegenover "uitlanders". Het is en voor hem en voor ons land hoog noodig dat wij dit wantrouwen tot de gepaste afmetingen doen inkrimpen. Dit kan alleen geschieden door de kennismaking en den omgang met beschaafde en bekwame Europeanen, die niet behept zijn met de, in Engeland zoo gewone, opinie dat er voor de "beschaving" van den "Dutch Boer" nog minder te wachten is dan van den Kaffer.

Wij dringen bij herhaling op dit laatste gezichtspunt aan. Men vindt toch vele wetenschappelijke mannen, die, wat bekwaamheid in hun vak en andere hoedanigheden aangaat, zeer geschikt zouden zijn om aan zulk eene expeditie deel te nemen, maar die hoegenaamd geen oog hebben voor de goede eigenschappen van het Afrikaner ras, terwijl zij daarentegen zijne gebreken door een vergrootglas bezien. Dit is geen wonder. Want de ontwikkeling van het Afrikaner ras is geheel buiten den invloed

deven der achttiende-eeuwsche wereld- en levensbeschouwing, die in ropa zoo gewichtige gevolgen heeft gehad. Men moet daarom tot onze entiende eeuw teruggaan om mannen te vinden, die, wat denkbeelden gevoelswijze aangaat, met Afrikaners te vergelijken zijn. Geologen en atkundigen met zooveel historisch inzicht, dat zij eene andere beschag dan onze negentiende-eeuwsche op den rechten prijs weten te waarten, zijn niet zeer talrijk. Toch moeten zij voor deze expeditie gevonden den, zoo zij niet alleen het wetenschappelijk doel zal bereiken, dat Genootschap beöogt, maar ook het nationale, dat wij behartigen. De Nederlandsche expeditie, samengesteld uit mannen, die den Afrikaner voor een wonderlijk en ouderwetsch schepsel aanzien, zou veel kwaad in aan het streven onzer Vereeniging.

k meen mij te moeten bepalen tot deze weinige opmerkingen, die natuurlijk bereid ben mondeling — of des noods schriftelijk — zool mogelijk toe te lichten, als Gij het denkbeeld eener expeditie naar d-Afrika niet geheel onuitvoerbaar acht.

Hoogachtend heb ik de eer te zijn

Uw Dw. Dr.

Namens het Bureau der N. Z. A. V. C. B. SPRUYT, Secretaris.

jlage D.

24 Juni 1889.

Aan het Bureau der Nederlandsch-Zuid-Afrikaansche Vereeniging te Amsterdam.

Namens het Bestuur van het Kon. Ned. Aardrijkskundig Genootschap bik de eer U mede te deelen, dat ter volledige Bestuursvergadering, na 22sten dezer gehouden, na rijpe overweging, besloten is, aan Uwe treeniging voor te stellen, gemeenschappelijk pogingen aan te wenden van de Regeering der Transvaalsche Republiek de noodige gelden te krijgen tot bestrijding van de kosten eener daarheen te zenden wetenkappelijke expeditie.

Het door U voorgestelde denkbeeld werd, in beginsel, door de bestuurslen toegejuicht, zoowel wegens het wetenschappelijk als wegens het lionaal belang, welke beide door U op den voorgrond worden gesteld. Men was echter van meening dat de benoodigde gelden — waarvan he bedrag, naar eene globale berekening, en indien de duur van het onder zoek op een jaar wordt gesteld, tot omstreeks 15 à 20 duizend gulder zou stijgen — hier te lande niet te verkrijgen zouden zijn, terwijl on Genootschap over zulke aanzienlijke sommen niet kan beschikken.

Daarentegen waren vele bestuursleden het gevoelen toegedaan dat de Zuid-Afrikaansche Republiek, met hare flinke, hoezeer wetenschappelijl over het geheel niet hoog staande bevolking, gaarne de gelegenheid za aangrijpen om een wetenschappelijk onderzoek van de bodemgesteldheid en den plantengroei des lands te doen plaats hebben, met den waarbon dat eene uit Nederlandsche geleerden bestaande expeditie, door vereenigingen in Nederland voorbereid en uitgerust, ongetwijfeld belangrijk uitkomsten zal verkrijgen.

Met de betuiging mijner gevoelens van hoogachting heb ik de eer mi te noemen

Uw Dw. Dr.
J. Æ. C. A. TIMMERMAN,
Secretaris des Genootschaps.

Bijlage E.

VOORSTEL tot het instellen van wetenschappelijke onderzoekin gen in het gebied der Zuid-Afrikaansche Republiek, ontwikkelt door den Voorzitter van het Kon. Ned. Aardrijkskundig Genoot schap in de volledige Bestuursvergadering van 15 Febr. 1890.

Gelijk bekend is werd het Bestuur van ons Genootschap indertijd door dat van het Studiefonds voor de Zuidasrikaansche studenten aangezoch om het initiatief te nemen tot het in het leven roepen eener wetenschap pelijke expeditie, die in de Transvaalsche Republiek onderzoekinger zoude instellen, vooral op geologisch gebied.

Hoofdzakelijk uithoofde der groote kosten, die daaraan verbonden zullen zijn, werd daartegen aanvankelijk bezwaar gemaakt, ofschoon het denkbeeld op zichzelf gereede instemming mocht vinden. Nadat echten het bestuur van het Studiefonds zich bereid verklaard had tot eenige geldelijke bijdrage en ook meende dat handelslichamen, met de Republiek in relatie staande, wel genegen bevonden zouden worden in gelijken zin daartoe mede te werken, heeft het Bestuur gemeend de zaak in ernstige

overweging te kunnen nemen, al zoude ons Genootschap ook weinig of nit bij machte zijn in de daaraan verbonden kosten te deelen.

Daarop is aan den heer Dutoit, tijdens diens verblijf alhier, een onderloud verzocht, hetgeen welwillend werd toegestaan en waaraan, behalve for onzen Voorzitter, Onder-voorzitter en Secretaris, ook door het bestuur ma genoemd Studiefonds werd deelgenomen.

Bij die gelegenheid bleek dat de heer Dutoit het denkbeeld in hooge mate toejuichte, als kunnende leiden tot zeer belangrijke practische gewigen voor den bloei der Transvaalsche Republiek.

Daarbij werd vooral ook ter sprake gebracht het punt der groote kosten aan de uitrusting, de reis, maar vooral het verblijf in Zuid-Afrika (van welk laatste de duur op minstens twee jaren werd begroot, wilde men kans hebben tot eenigszins voldoende resultaten te komen) verbonden.

Den heer Dutoit werd bij die conferentie aangetoond dat, mocht men het hier te lande al zoover brengen, dat de expeditieleden goed uitgerust de reis naar de Republiek konden doen, met de aan ons Bestuur toegezegde geldelijke hulp, de zeker niet onbelangrijke, maar van hieruit met geene mogelijkheid te berekenen, kosten van het verblijf en het reizen in Zuid-Afrika, in geen geval door het Genootschap zouden kunnen gedragen worden. Daarvoor zoude positief gerekend moeten kunnen worden op volledige hulp van de zijde der Hooge Regeering van de Republiek

De heer Dutoit, ofschoon uitdrukkelijk verklarende ter zake niet van emig mandaat voorzien te zijn, was echter geenszins bevreesd dat, inten de practische voordeelen, die zoodanig onderzoek kans hebben op te leveren, goed werden uiteengezet in eenig ter zake dienend rapport of memorandum, hij, daarvan voorzien, na zijn terugkeer in de Transvaal, zich gaarne zoude belasten met het ondersteunen van het plan bij de Rooge Regeering aldaar, waarvan hij zich goede vruchten beloofde.

Oschoon nu het bestuur van ons Genootschap zeer zeker niet genegen bevonden zal worden om de hier bedoelde wetenschappelijke expeditie in het leven te roepen en naar hare bestemming te doen vertrekken alvorens het de officiëele bewijzen zal hebben ontvangen dat de Transvaalsche Regeering alle de kosten, aan het verblijf en de werkzaamheden der tepeditieleden verbonden, op zich neemt en het met de juiste, daarvoor beschikbaar gestelde, bedragen in kennis zal zijn gesteld, zoo meende het de ontvangen toezegging van den heer Dutoit van genoegzaam gewicht mogen achten om pogingen aan te wenden het gewenschte rapport toor een bevoegd deskundige te doen samenstellen en wel het liefst door immand, die, indien de zaak tot stand komt, tevens wellicht genegen zou

worden bevonden zich aan het hoofd der onderneming te stellen en zi in persoon met het bedoelde onderzoek te belasten, daarin bijgests door zoodanig personeel als noodig wordt geacht.

Daarin nu is ons Bestuur, naar het vermeent, bij uitnemendheid slaagd. Het heeft een voorloopig rapport ontvangen, waarin in e eerste hoofdstuk het voornaamste, zoo niet alles, wat omtrent de geolog van Zuid-Afrika in het algemeen bekend is geworden, is bijeengebraa met een vlijt, met eene bestudeering van alle bestaande geschrifte boven allen lof verheven, terwijl daarin de hoofdpunten zijn aangegeve waarin ter zake nog onzekerheid bestaat en waarin de geleerden het n oneens zijn.

In een tweede hoofdstuk is ditzelfde toegepast op de Transvaal in e geren zin en daaruit blijkt, dat de gegevens aldaar over het algeme veel minder ruim vloeien dan voor de overige gedeelten van Zuid-Afrik dat aldaar dus een zeer ruim gebied van onderzoek braak ligt.

In een derde en laatste hoofdstuk is verder uit een en ander afgelei wat de eigenlijke taak der expeditie zoude dienen te zijn en hoe zij zou moeten zijn samengesteld.

Aan dit laatste ontleenen we het navolgende:

Onderzoekingen zouden behooren te worden ingesteld:

- 1°. Naar het verband der verschillende terreinen, die gewoonlijk te dezelfde formatie worden gerekend.
- 2°. Onderzoek en karteering van de Stormberglagen in de Transvaalsch Republiek en het verzamelen van alle gegevens omtrent het voorke men van steenkool in deze lagen.
- 3°. Vergelijkend onderzoek van de recente vormingen in de verschillend deelen der Republiek.
- 4°. Aard en voorkomen van ertsen vooral van goud in de verschi lende formaties, zooveel doenlijk met bepaling der grenzen van goud houdende formatien.
- 5°. Onderzoek naar alles wat omtrent het vinden van diamanten in d Transvaal bekend is, gepaard met opnemingen der omstreken van d voornaamste riverdiggings langs de Vaal- en Hart-rivieren.
- 6°. Onderzoek naar de afwatering van den bodem en het ineengrijpel der verschillende stroomgebieden in de Republiek.
- 7°. Nagaan der algemeene reliefverhoudingen, op zelfstandige hoogtemetingen steunende.
- 8°. Samenstelling van eene geologische schetskaart van het door de expeditie

Mocht van een en ander in den beperkten tijd van twee jaren het een of ander achterwege moeten blijven, daartegenover staat dat de expensie in andere opzichten weder veel meer kan doen dan hierboven is nagegeven.

Men mag toch aannemen dat de leden steeds een open oog zullen bien voor de groote algemeene geologische problemen, die in Zuidkika nog onopgelost bleven, dat zij zooveel mogelijk waarnemingen
tent temperatuur, windrichting en windkracht, neërslag, bewolking,
tenen, onweders enz. zullen verrichten en alle gegevens verzamelen
de kennis van het klimaat kunnen vermeerderen, terwijl bovendien
des de aandacht zal worden gevestigd op het verband tusschen de
blogische gesteldheid van den bodem en den plantengroei.

Voorzeker dus nuttige arbeid te over, en waardoor tevens ook plaatsebe belangstelling in wetenschappelijk onderzoek kan worden opgewekt.
Behalve de geoloog, die aan het hoofd der onderneming zoude moeten
an, is ter bereiking van het doel een ervaren topograaf noodig en
den die heeren vergezeld moeten zijn van een bediende, die niet alleen
n vertrouwd persoon moet zijn, maar die bovendien reeds werkzaam
geweest aan eenig geologisch laboratorium of althans eenigermate verouwd met hetgeen aldaar verricht wordt.

An ieder dezer drie bedoelde personen zal een ruim salaris moeten orden toegelegd, terwijl alle uitgaven, die zij in het belang der hun gedragen taak noodig hebben te doen, hun moet worden vergoed.

Noch het bedrag dier salarissen, noch eene raming der overige uitgaven van hieruit te bepalen; dit moet aan de Regeering der Transvaalsche epubliek worden overgelaten. Intusschen zal toch het bedrag van de larissen hier vooraf officieel bekend moeten zijn, wil men er in slagen geschikte personen voor de zaak te engageeren.

Hoe zij hunne taak zullen verrichten, hetzij Pretoria als hoofdverblijf iezende, waarheen zij de verzamelingen, die zij op hunne reizen door Republiek bijeenbrengen, dirigeeren om ze aldaar te verwerken of tar Europa te zenden, hetzij, wat wellicht meer verkieselijk is, dat zij tens nieuwe tijdelijke uitgangspunten kiezen van waaruit de omtrek tadt onderzocht, kan een onderwerp van later zorg uitmaken, eerst na takomst in de Transvaal en in overleg met de autoriteiten aldaar vast stellen. Ook of op de reis van Kaapstad naar Pretoria reeds enkele tions zullen worden gekozen, die uit een geologisch oogpunt belangrijk taden geacht, om zich reeds vooraf te orienteeren in de bestaande toemden.

Hoofdzaak is hier om positief en zoo mogelijk spoedig te weten of, in welke mate, de Hooge Regeering van de Transvaalsche Republiek de onderneming belang stelt en genegen wordt bevonden de hooger doelde daaraan verbonden uitgaven te dragen. Aangezien het hier nu n steeds onbekend is op welk tijdstip de heer Dutoit de terugreis aanvaa en in de gelegenheid zal zijn de zaak bij zijne Regeering aanhangig maken, heeft het Bestuur van het Kon. Ned. Aardr. Genootschap meend zich inmiddels rechtstreeks ter zake tot die Regeering te moet wenden, onder overlegging van een afschrift van het in dit schrijven doeld voorloopig verslag. Wordt toch de onderneming door bedoel Regeering werkelijk nuttig geacht — waaromtrent trouwens dezerzij weinig twijfel bestaat — dan is het tevens zaak daartoe spoedig te l sluiten en ook daardoor van Nederlandsche zijde het bewijs te levere dat men de zoo hooggeachte stamgenooten in Zuid-Afrika gaarne op de lijke en afdoende wijze van nut wenscht te zijn.

Het Bestuur van het K. N. A. G. zal er dus hoogen prijs op stellt te mogen vernemen wat de Transvaalsche Regeering te dezen aanzien willen besluiten.

Bijlage F.

Aan het Hoofdbestuur van het Koninklijk Nederlandsch Aar rijkskundig Genootschap.

De ondergeteekende neemt de vrijheid het volgende onder uwe au dacht te brengen.

Reeds bij een schrijven van Z. Exc. den Minister van Binnenlandsch Zaken, van den 7en Februari 1874, aan de Koninklijke Akademie va Wetenschappen, werd de noodzakelijkheid van eene verbeterde geologisch kaart van Nederland uitgesproken, en in een missive van den 26en Mi 1886 van Z. Exc. den Minister van Binnenlandsche Zaken, eveneens 22 genoemd collegie gericht, werd op nieuw advies dienaangaande gevraage Het rapport hierop den 2en April 1887 door eene commissie uit di Koninklijke Akademie van Wetenschappen uitgebracht, luidde in hoofd zaak, om voorloopig de geologische kaart van Staring onveranderd te laten herdrukken, terwijl de kosten werden opgegeven aan de vervaar diging van een verbeterde geologische kaart verbonden, waarvoor eer voorbereidende arbeid van twaalf jaren werd noodig geacht.

Het is niet gebleken, dat er plannen van regeeringswege bestaan, om dit advies tot uitvoering te brengen. In de vergadering van den 27en Juni 1889 van de Afdeeling Natuurkunde der Koninklijke Akademie van Weschappen, werd door de commissie van de geologische kaart dan ook inden, om de Regeering te verzoeken, haar opmerkzaam te maken op it groote werken, waarbij geologisch onderzoek kon plaats hebben en ine jaarlijksche subsidie van f 500.— voor reis- en verblijfkosten tot in onderzoek toe te staan.

Op dit standpunt bevinden wij ons thans ten opzichte van het verkrijnener geologische kaart van ons eigen land. Dat de kaart van Staring, verdienstelijk ook voor den tijd, waarop zij is samengesteld, veel te inschen overlaat, werd reeds in 1874 door de Regeering erkend, en dervindt men schier dagelijks.

Doch niet alleen wat de geologie betreft, ook in andere opzichten uit de kennis van ons land zeer veel te wenschen over. Met den dag uit de behoefte dringender, om hierin verbeteringen aan te brengen. In daarbij komt, dat belangrijke schatten van waarneming, die bij het mleggen der groote werken in Nederland, bij het doen van boringen, tavingen, bij ontginningen enz. enz. kunnen gedaan worden, grootenteis verloren gaan of onvruchtbaar blijven voor de wetenschap en de taktijk. Ware men sedert het overlijden van Staring in zijne richting nortgegaan en hadden de aardrijkskundigen zijne methode gevolgd, wij unden niet zoover achterstaan als thans het geval is. Dat dit ook door geologische commissie der Koninklijke Akademie van Wetenschappen thend wordt, bewijst haar laatste besluit, van 27 Juni, zoover wij dit it het verslag in de Staatscourant kennen.

Evenwel meenen wij, dat het laatste voorstel, waartoe genoemde comissie wel moest komen, niet aan de eischen zal kunnen voldoen, die men
in de algemeene kennis van ons vaderland mag stellen. Niet uitsluitend
geologisch opzicht, doch in alle opzichten moeten wij ons land kenen. De Regeering zoowel als particulieren, landbouw en veeteelt, hanen nijverheid, waterstaatkundigen en militairen, voor hen allen is
kennis van het grootste belang. Dat dit gevoeld wordt, blijkt ook
haruit, dat verschillende vereenigingen en instellingen het onderzoek
en ons vaderland in eenigen vorm op haar programma hebben. Om
en de kennis van ons land uit te breiden, zonder door te groote kosten
erin verhinderd te worden, moet men de arbeidskrachten op dit geeid concentreeren. De ondergeteekende meent, dat dit kan geschieden
bot de oprichting van een geologisch-geographisch centraalbureau.

Op de sectie-vergadering voor Geologie en Physische Geograp van het eerste Natuur- en Geneeskundig Congres, den 30en Septem te Amsterdam gehouden, heeft hij een plan dienaangaande reeds in gemeene trekken uiteengezet. Bij deze vergadering vond dit denkbe bijval en ook van andere zijden werd eene dergelijke instelling wensc lijk geacht.

Zulk een centraalbureau zou steeds een waakzaam en open oog m ten houden op alle feiten, die voortdurend omtrent de kennis van c land verzameld kunnen worden. De gelegenheid om dergelijke feiten leeren kennen en te verzamelen, zou daardoor niet ongebruikt voord gaan, en het verwijt, dat wij ons moeten doen, omtrent het verlor gaan van veel wetenswaardigs, zou hiermede eindigen. Door bevoeg hand zouden die feiten voortdurend bewerkt moeten worden, en ald zou dit centraalbureau tot het middelpunt van inlichtingen en ond zoekingen worden. Wat het meteorologisch Instituut is op zijn gebi zou dit bureau moeten zijn in geographisch-geologische richting. Vo dergelijk bureau zal de bewerking eener verbeterde geologisch-agronon sche kaart kunnen voorbereid worden en in elk opzicht de kennis voors land worden uitgebreid.

De ondergeteekende richt zich tot het Hoofdbestuur van Uw Genor schap, daar hij meent, dat het op zijn weg ligt, om deze zaak ter hat te nemen. Hij stelt zich voor, dat dit zich tot verschillende belanghe bende en belangstellende vereenigingen zal kunnen wenden om hiervode fondsen voor een geologisch-geographisch centraalbureau te verkrijge

Op die wijze zal deze zaak eene volkszaak worden, en de Regeering die bij het welslagen hiervan meer dan iemand belang heeft, zal zw ook in dezen niet terughouden.

Bij eene praktische uitvoering van deze zaak kan er, zelfs zonder groo geldelijke middelen, veel gedaan worden. Gaarne verklaart zich onde geteekende bereid, om het hoofddenkbeeld, dat in dit schrijven slech in algemeene trekken is omschreven, en dat hij reeds met Uwen Vic Voorzitter besproken heeft, ook voor U nader toe te lichten. Ik heb b vaste vertrouwen, dat het bij Uwe vergadering sympathie zal vinden.

Amsterdam, 17 September 1889.

Dr. H. BLINK.

lage G.

AMSTERDAM, 30 November 1889.

Aan het Hoofdbestuur van het Koninklijk Nederlandsch Aardrijkskundig Genootschap.

gevolge de opdracht van het Bestuur van Uw Genootschap aan eene missie, om een plan tot oprichting van een Central-bureau voor geoche en geographische waarnemingen vast te stellen, hebben wij de namens genoemde Commissie, het volgende rapport van onze werkheden uit te brengen.

eerste Vergadering der door U benoemde Commissie werd gehouop Vrijdag den 18ten November. De Heer C. M. KAN, aan wien
den Heer J. KUYPER als oudste in jaren, die taak was overgedraopende de Vergadering. De eerste werkzaamheid bepaalde zich tot
benoemen van een Voorzitter, wegens het bedanken van den Heer
MARTIN als zoodanig. Krachtens het schrijven namens Uw Bestuur,
den 25sten October 1889, besloot de Vergadering tot eene keuze uit
midden over te gaan en met eenstemmigheid werd de Heer C. M.
tot Voorzitter benoemd.

Prvolgens werden de notulen der Bestuursvergadering van het Kolijk Nederlandsch Aardrijkskundig Genootschap, waarin de benoeming r Commissie had plaats gevonden, door den Voorzitter voorgelezen, op grond eener verklaring in het schrijven van den Heer H. BLINK genoemd Genootschap, waarin hij zegt bereid te zijn zijne meeninomtrent het Centraal-bureau nader uiteen te zetten, wordt aan dezen woord gegeven.

Heer H. BLINK zeide, dat, met het oog op een welslagen van plan, het hem gewenscht voorkomt, niet één maar twee ontweraan te bieden; een van een meer volledig Bureau, waarbij uiteentwordt, wat uit een wetenschappelijk oogpunt het meest wenscheis, en daarnaast een minder omvattend, uitsluitend praktisch plan, ook bij geringer finantieele hulpmiddelen kan worden uitgevoerd. bijlagen worden beide ontwerpen, het uitvoerige als Bijlage I en laatste als Bijlage II, aan dit schrijven toegevoegd. De Heer BLINK hierbij zijne meening uit, dat, hoewel ontwerp I hem het meest schelijk voorkomt, toch, zoo de noodige finantiëele middelen hiert ontbreken, ontwerp II zou kunnen dienen, om een begin van uiting aan het onderzoek te geven en aldus te toonen, wat men wenscht,

ten einde op die wijze Regeering en Volk met belangstelling te beziel voor het vollediger plan.

De Heer C M. Kan geeft daarop in overweging zich van den as vang af meer uitsluitend de samenstelling eener geologische kaart voorgen te stellen. Men blijft dan meer op het terrein van het Aardrij kundig Genootschap en van de geographische wetenschap, daar voor dere wetenschappen voldoende krachten werkzaam zijn; men zou vode samenstelling dier kaart den zedelijken of geldelijken steun van v schillende vereenigingen en lichamen kunnen inroepen, in de eerste pla van de Koninklijke Academie van Wetenschappen, van het Koninkl Nederlandsch Aardrijkskundig Genootschap, enz.

Ontving men op die wijze voldoenden geldelijken steun, dan zou m vervolgens de medewerking van de Regeering kunnen vragen.

Werden die fondsen gevonden, dan zouden bureaux kunnen en moet opgericht worden voor het opnemen en carteeren, welke bureaux de l doelde waarnemingen konden verrichten, verzamelen, informaties geve inlichtingen vragen, enz. enz.

Op die bureaux konden dus goed gevormde en alleszins betrouwbare wa nemers op geologisch en geographisch gebied werkzaam zijn, alsme de verzamelingen geconcentreerd worden. Van deze eindelijk konden o de publicaties uitgaan.

Bij de algemeene bespreking werd opgemerkt, dat het denkbeeld v den Heer Kan tot uitvoering zou komen, als plan I werd verwezenlij Door de Vergadering werd vervolgens besloten in de eerste plaats o werp II te behandelen, als zijnde minder omvangrijk en eerder voor v wezenlijking vatbaar.

De behandeling van ontwerp II had plaats in de Vergadering van d 1sten November en na eenige wijzigingen werd dit ontwerp voorloop goedgekeurd. De definitieve vaststelling werd bepaald op de volgen Vergadering, ten einde de leden in de gelegenheid te stellen het o werp nogmaals rijpelijk te overwegen. Met dit doel werd een afsch van ontwerp II door den Secretaris aan al de leden toegezonden. In voltallige Vergadering der Commissie van den 17den November 18 werd ontwerp II nogmaals besproken en, na nog enkele wijziginge met eenstemmigheid goedgekeurd.

Ook werd ontwerp I nogmaals voorgelezen en door de Vergaden besloten, dit onder de bijlagen op te nemen, ten einde op die wi het Bestuur van het Koninklijk Nederlandsch Aardrijkskundig Genoschap hiermede in kennis te stellen.

Darop werd de vraag behandeld, of het als taak van deze Commissie bedouwd werd, om, met het oog op eventueele aanneming van ontwep I, omtrent de personen te adviseeren, die met de uitvoering daarwa zouden belast kunnen worden. Die vraag werd, na beraadslaging, bemigend beantwoord. Daarop besloot de Vergadering eene aanbeveling ne zes personen voor elke afdeeling op te maken. Na ernstige beraading viel de keuze op de volgende personen, die wij in alphabetiche volgorde noemen.

A. Voor de Afdeeling Geologie:

Prof. Dr. J. M. VAN BEMMELEN.

Prof. Dr. F. J. P. VAN CALKER.

Dr. H. VAN CAPELLE Jr.

Dr. J. Lorié.

Dr. G. A. F. MOLENGRAAFF en

F. E. L. VEEREN.

B. Voor de Afdeeling Geographie:

A. A. BEEKMAN.

Dr. H. BLINK.

P. R. Bos.

C. LELY.

J. W. WELCKER.

JOHAN WINKLER.

De Commissie meent hiermede aan het einde harer werkzaamheden komen te zijn. Onder dankzegging voor het in haar gestelde vertroun biedt zij Uw Bestuur dit rapport aan, en verklaart zij zich hiermede konden.

> Namens de Commissie tot het ontwerpen van een plan voor een Centraal-bureau voor geologische en geographische waarnemingen.

> > C. M. KAN, Voorzitter. H. BLINK, Secretaris.

BIJLAGE I.

1. Er wordt een geologisch-geographisch Centraal-bureau opgericht, waarvan het doel is, geologische en geographische onderzoekingen in Nederland in te stellen, ten einde te verkrijgen: geologische, geographische, ethnographische, agronomische en andere kaarten en beschrijvingen van Nederland, die op de hoogte van den tegenwoordigen stand der wetenschap staan.

Het Bureau zal met dit doel niet alleen zelf werkzaam zijr maar zich daarvoor ook de medewerking van de Regeering, weter schappelijke lichamen en vereenigingen en van particulieren track ten te verzekeren.

- 2. Het Centraal-bureau voor geologie en geographie bestaat uit twe hoofd-afdeelingen, eene voor geologie en eene voor geographie, me een geoloog en een geograaf aan het hoofd van ieder deze betrekkelijke afdeelingen.
- 3. Dit Bureau wordt gevestigd in de meest daarvoor geschikte stad va Nederland.
- 4. De Directeuren genieten eene vaste jaarwedde, benevens vergo ding voor reis- en verblijfkosten.
- 5. Zij hebben een bepaald crediet om daarvoor onderzoekingen te doe en te laten doen.
- 6. Aan deze Bureaux kunnen verbonden worden geologen en geogn phen, die, onder vaste jaarwedden en tegemoetkomingen, arbeide op het bepaalde gebied, terwijl onder hun eigen naam de onde zoekigen gepubliceerd worden.
- 7. Jaarlijks wordt er een bewerkt systematisch verslag uitgebracht val de resultaten en feiten, welke in het afgeloopen jaar zijn verkregen
- 8. Daarenboven verzamelt elke afdeeling op haar gebied, uit verschij nende en vroeger verschenen litteratuur, de feiten enz., welke zi voor het aangegeven doel belangrijk acht, en publiceert die ver kort in het verslag, met nauwkeurige aanwijzing der bronnen.
- 9. Het doel van het bureau zal tevens zijn, om in een bibliothee en een museum alles te verzamelen, wat tot bestudeering van d geologisch-geographische gesteldheid van ons land kan noodig zijt
- 10. Elk der afdeelingen van dit bureau geeft aan ieder die hieror vraagt de inlichtingen over eenig deel van ons land, welke z verschaffen kan, gratis.
- 11. Aan elk der bureaux wordt, zoodra dit door een drietal persone verzocht wordt, een cursus verbonden om tot het praktisch waar nemen en onderzoeken op geologisch en geographisch gebied voo te bereiden.
- 12. Aan de bureaux kunnen met dat doel praktische oefeningen ge houden worden en aan jonge lieden kan worden toegestaan, onde leiding van den Directeur te werken.
- 13. Zoodra de geologische resultaten eenigzins voldoende zijn worder die in een nieuw uit te geven geologische kaart neergelegd.

Ook de resultaten van geographischen aard worden, zoodra zij eenigszins voldoende zijn, in kaarten of zelfstandige beschrijvingen, die zoowel van praktischen als van theoretischen aard zullen zijn, neergelegd.

- 14. De beide afdeelingen, hoewel zelfstandig, werken zooveel mogelijk in overleg met elkander.
- 15. Na uitgave der eerst verkregen resultaten, in Art. 13 bedoeld, werken de afdeelingen verder, om die door nader onderzoek te verbeteren en uit te breiden.

BIJLAGE II.

I. Er wordt een geologisch-geographisch Centraal-bureau opgericht, waarvan het doel is, geologische en geographische onderzoekingen in Nederland in te stellen, ten einde te verkrijgen: geologische, geographische, ethnographische, agronomische en andere kaarten en beschrijvingen van Nederland, die op de hoogte van den tegenwoordigen stand der wetenschap staan.

Het Bureau zal met dit doel niet alleen zelf werkzaam zijn, maar zich daarvoor ook de medewerking van de Regeering, wetenschappelijke lichamen en vereenigingen en van particulieren trachten te verzekeren.

- 2. Dit Bureau bestaat uit eene Commissie, door het Koninklijk Nederlandsch Aardrijkskundig Genootschap benoemd, en onderverdeeld in twee afdeelingen: eene geologische en eene geographische afdeeling. Aan het hoofd van deze Commissie staan een Voorzitter en een Vice-Voorzitter, waarvan de een geoloog en de ander geograaf is.
- 3. Elk dier onderafdeelingen bestaat uit drie tot vijf personen. De Voorzitter en Vice-Voorzitter zijn de voorzitters der betrekkelijke afdeelingen.
- 4 De Voorzitters der afdeelingen staan aan het hoofd der werkzaamheden van hunne afdeelingen. Zij worden daarin door de overige leden bijgestaan.
- 5. Door het Bestuur van het Koninklijk Nederlandsch Aardrijkskundig Genootschap wordt aan elk der afdeelingen van jaar tot jaar eene bepaalde som toegestaan, die zij naar eigen oordeel voor het onderzoek en de bewerking van het gedane onderzoek kan besteden.
- Een overzicht der resultaten van dit onderzoek wordt aan het einde van elk jaar voor rekening van het Koninklijk Nederlandsch Aard-

- rijkskundig Genootschap gepubliceerd. Ook kunnen daaraan ande stukken worden toegevoegd die de afdeeling voor het bepaalde de wenschelijk acht.
- 7. Het Koninklijk Nederlandsch Aardrijkskundig Genootschap st daarvoor jaarlijks een bepaald aantal vellen druks, hetzij van l Tijdschrift, hetzij als zelfstandig geschrift, ter vrije beschikking v de Commissie.
- 8. Het verzameld materiaal blijft het eigendom van de Commissi om later, wanneer men tot de oprichting van een vollediger F reau, hetzij particulier- of Rijks-bureau mocht overgaan, daara te worden overgedragen.
- 9. De gelden worden verkregen door bijdragen van het Koninkli Nederlandsch Aardrijkskundig Genootschap, van de Regeerin belanghebbende en belangstellende vereenigingen en particulieren
- 10. Het jaarlijksch overzicht der resultaten van het onderzoek wor aan elk der contribuëerenden gratis toegezonden.

Bijlage H.

Key-eilanden, 30 Juni '89.

Aan het Bestuur van het Kon. Nederl. Aardrijkskundig Genootscha

Hierbij heb ik de eer u een kort verslag aan te bieden van de wrichte werkzaamheden in de laatste 3 maanden.

Na het vertrek der vorige mail heb ik een begin gemaakt met de o neming der Westkust van Klein Key, en heb hiervan een groot gedeel in kaart gebracht. Ik had evenwel veel verder kunnen zijn, als het wed niet zoo ongunstig geweest was.

Voortdurend hadden we stilte of het waaide een halve storm, vergeze van den noodigen regen, nu eens uit het Westen, dan weder uit h Oosten.

Eens zelfs waren we bijna het slachtoffer van het slechte weder gewe den. In het laatst van April hadden we al voortdurend flauwe zuchtjest het Oosten, zoodat ik 's avonds van den 30en April dan ook zonder b zwaar aan de Westkust van Poeloe Baeer ten anker kwam, om daar ee rustigen nacht door te brengen.

Te middernacht, terwijl we allen in diepen slaap gedompeld zijn, kant er uit het N. W. verschrikkelijk weder opzetten en brengt zulke booge zeeen mede, dat ik niet anders dacht of mijn scheepje zou op het rif uit elkander geslagen worden. Dat het niet gebeurd is kan it mij nog niet begrijpen, daar het verscheidene malen op de steenen motte.

Ik heb dan ook respect gekregen voor de scheepsbouwkunde der bewing. De prauwen en kleine scheepjes die ze bouwen zijn ijzersterk toch geloof ik dat menig Hollandsch scheepsbouwmeester vreemd zal spkijken, indien ik later hun wijze van bouwen mededeel.

Twee sloepen, die ik achteruit op sleeptouw had, zijn in dien nacht

Toch ben ik al zoover gevorderd dat ik in Augustus met Klein Key greed hoop te zijn. De meer afgelegen eilanden, zooals de Tajando-groep, zal ik vooreerst moeten laten liggen, aangezien het met Oost-moeson te hard waait en daar te veel zee staat.

Het is dan mijn plan aan Groot Key te beginnen, waarvan ik al alle bergtoppen bepaald heb, of met de topographische opneming van Klein Key. Dat zal afhangen van het weder.

De meteorologische waarnemingen werden geregeld voortgezet.

Ethnographische voorwerpen werden verzameld en enkele photographische opnamen gedaan.

Ongeveer 14 dagen geleden had ik het genoegen per ss. "Batavia" den brief van het Genootschap, dd. 7 Maart, te ontvangen en de daarin vertet goede tijdingen te vernemen.

Zooals u uit mijne laatste verantwoording gebleken is, had ik nog over sime fondsen te beschikken, die nu nog vermeerderd zijn, zoodat de mantieele toestand uiterst gunstig is.

Buy en ik genieten de beste gezondheid en blijven altijd even op-

Onder mijn volk heeft eene kleine mutatie plaats gehad.

Tot nog toe had ik steeds vreemdelingen in dienst gehad en dit maakte het we in afgelegen kampongs wel eens achterdochtig aangekeken werken. Om dit te voorkomen heb ik de vreemdelingen weggezonden en harvoor Keyneezen in de plaats genomen, die mij ook heel goed besteel.

Van den heer Langen ondervond ik nog voortdurend hulp en onder-

De volgende mail hoop ik u te kunnen melden dat de hydrographisc opneming van Klein Key gereed is.

> Met de meeste hoogachting H. O. W. PLANTEN.

Bijlage J.

TOEAL, 5 October 1889.

Aan het Bestuur van het Kon. Nederl. Aardrijkskundig Genootscha

Ik heb de eer het Bestuur van het Kon. Ned. Aardr. Gen. het nav gende omtrent mijne werkzaamheden in de jongst verloopen maand mede te deelen:

Na het vertrek der vorige mail ben ik verder voortgegaan met de o neming aan de W. kust van Klein-Key en had gedacht in Augustus das mede gereed te zijn. Hierin ben ik evenwel teleurgesteld. Het eige aardige weder dat we dit jaar hebben is hieraan de schuld. De Oo moeson stond met zooveel kracht door, dat men het voor Indie w stormweer zou kunnen noemen en daarbij vergezeld van hevige regen Mijn werk vorderde toch wel, maar toen ik in het laatst van Juli me om de Zuid kwam, kreeg ik zooveel last van de hooge zee, dat het werkt ondoenlijk werd.

Ik besloot toen dit gedeelte te laten liggen tot de Oost-moeson zi kracht verloren zou hebben en een begin te maken met de W. kust vi Groot-Key.

Hier vlotte het werk beter. Wel hadden we veel last van harden wint vooral van valwinden, waardoor ik steeds genoodzaakt was met did gereefde zeilen te varen, maar de zee was altijd kalm.

De geheele kust is dan ook opgenomen en het aangrenzende vaarwatiopgelood. Als men nagaat dat deze kust, in een rechte lijn gerekend ± 13 D. M. lang is en het vaarwater een breedte van ± 3½ duitschmijlen heeft, behoef ik niet te zeggen dat het deze 2 maanden har werken geweest is. Dag aan dag waren we van 's morgens half zes te 's avonds 6 uur aan het werk. Zondagen ook, want ik wilde daar gereed komen.

Nu vergun ik mij evenwel een 14-daagsche rust, om mijn teeken-ei

schrijfwerk bij te maken, terwijl Buy met mijn volk bezig is de kotter op te knappen.

Het opnemingswerk gaat dus goed vooruit. Over een week begin ik weder aan de W. kust van Klein Key, waarmede ik, bij gunstig weder, soedig gereed hoop te zijn. Ook denk ik dan de verder afgelegen eilanten-groepen in kaart te kunnen brengen. Er blijft dan niets meer over dan de Oostkust van Groot-Key; dan zal ik Klein Key nog topographisch opnemen en hoop dan naar Nederland terug te keeren.

Andere werkzaamheden werden ook niet vergeten.

De meteorologische waarnemingen werden geregeld voortgezet; de verzuneling ethnographische voorwerpen groeit langzamerhand aan. Ik had er over gedacht deze nu te verzenden, maar ik heb nog geen tijd kunnen vinden om er eene beschrijving bij te maken.

Daar ik veel met de bevolking omga, leer ik veel van hare zeden an gewoonten kennen, waarover ik al vele aanteekeningen bezit, die ik later hoop uit te werken.

Van den heer Langen ondervind ik nog altijd den meesten steun.

Buy en ik genieten steeds de beste gezondheid. De bevolking is anders den laatsten tijd hevig geteisterd door kwaadaardige koortsen. In vele negogen was ± ½ der bevolking gestorven, terwijl de overblijvenden, uit vrees, in het bosch kampeerden. De menschen smeekten mij om geneesmiddelen, maar, daar mijn apotheek niet ingericht is op zulk een epidemie, was mijn chinine spoedig op en hielp ik toen maar met versterkende middelen, als melk, enz.

Ze toonen nu hun dankbaarheid door het zenden van kippen, eieren,

Met de meeste hoogachting

H. O. W. PLANTEN,

Luit. ter Zee.

Bijlage K.

TOEAL, 30 Oct. '89.

Aan het Bestuur van het Kon. Nederl. Aardrijkskundig Genootschap.

Met de mail had ik u het een en ander willen mededeelen, doch ik wid daarin door ziekte verhinderd. Het schijnt dat ik ook mijn deel

moest hebben van de hier heerschende koortsen. Terwijl de boot he was had ik deze vrij hevig; van daar dan ook dat ik mijn verslag; plotseling afgebroken heb. Langzamerhand werden ze minder en ik her nu sedert 4 dagen geheel vrij van, doch gevoel mij nog erg zwak. kan geen uur staan teekenen of ik ben doodmoede. Jammer dat ik hegenwoordige mooie weder zoo ongebruikt moet laten voorbijgaan. Enf de volgende week hoop ik weer ferm aan het werk te gaan.

Ik had het genoegen de geëerde letteren van het Bestuur dd. I J te ontvangen en daaruit de gunstige beschikking omtrent mijn tracteme te vernemen, waarvoor ik mijn welgemeenden dank betuig.

Benevens deze aangename tijding ontving ik ook minder aangename De administrateur hier ontving nl. van den heer Ad. Langen een ke schrijven uit Batavia, waarin ZEd. meldde dat hij wegens ziekte na Europa vertrok en machtiging gaf om met de boeken naar de hh. Mohrm te Macassar, die als gevolmachtigden optreden, te gaan om af te rekene

De boot bracht niets mede, noch geld, noch levensmiddelen.

De administrateur vertrekt over een paar dagen en komt niet me terug en daar er niemand is om de zaak te behartigen, wordt zij voo eerst gesloten.

Ik kan dus den eersten tijd op geen steun rekenen, want er is niet Nu heb ik aan de hh. Mohrman geschreven, zoo goed te willen zijn m te melden of de heer L. ook iets omtrent de Key-expeditie geschreve heeft, en wanneer deze zijn steun niet ingetrokken heeft (dat ik nie geloof), mij dan het benoodigde uit Macassar te willen zenden.

Hoe het dus verder gaan zal, weet ik nog niet; doch zal u dit, zo spoedig ik bericht krijg, melden. De heer Langen zelf is met de best bedoelingen jegens de expeditie bezield, want in al zijn vorige brieve gaf hij steeds order, mij met alle ten dienste staande middelen te helpen doch die middelen zijn er nu niet, en dat is, geloof ik, aan hem or bekend.

Ik hoop dat alles zich ten goede zal schikken. Mocht dit niet zoo zijn dan zal dat wel eenigen invloed op mijn werk hebben. Hoe het ook zij de hydrografische opneming zal ik geheel ten einde brengen.

Met de volgende mail hoop ik u goed nieuws te kunnen melden.

Uw Dienstw. Dr.

H. O. W. PLANTEN.

ilage L.

TOEAL, 22 December 1889.

n het Bestuur van het Kon. Nederl. Aardrijkskundig Genootschap.

k heb de eer u het volgende omtrent mijne werkzaamheden in de loopen 3 maanden mede te deelen.

In mijn vorig verslag meldde ik dat de bevolking hevig geteisterd werd be koortsen, niet denkende dat ik daar ook zoo spoedig mijn deel van krijgen. Terwijl de mailboot hier was kreeg ik deze ook in hevigen ad en zij verzwakten mij in eenige dagen zoodanig, dat ik de eerste ken niet in staat was iets uit te voeren.

Eerst den 28en October kon ik weder op reis gaan, om aan de Westkt van Klein-Key verder te gaan werken. Door fraai weder begunstigd am ik daar goed vooruit. De verder afgelegen eilanden, zooals Oer, nier, Key-Tenimber, werden opgenomen, overal gelood, enz.

Nu rekende ik er op dat de West-moeson, evenals verleden jaar, half cember zou doorkomen, en ik dus tot zoo lang mooi weer zou houden, ar werd hierin teleurgesteld. Terwijl ik half November op Key-Tenimber s, kwam deze met zulk een geweld door, dat ik voor het slechte weer binnen moest vluchten, hetwelk 14 dagen aanhield.

Dat de West-moeson zeer veel vroeger hier is ingetreden dan anis het geval is, blijkt ook hieruit, dat de bevolking pas kort te voren it al hare prauwen op sleeptouw haar jaarlijkschen tocht naar Banda, abon, Ceram enz. aangevangen had, om ze op deze plaatsen te veropen, doch nu door den West-moeson genoodzaakt was van uit zee ing te keeren.

Den 3en December kon ik weder naar buiten gaan en, hoewel we nu dan allerhevigste buien hadden, kon ik toch nogal doorwerken, doch n 18den moest ik weder naar binnen gaan, daar, door den harden wind, jn zeilen aan flarden gewaaid zijn.

Ik ben nu druk bezig de schade te herstellen. Onderwijl stormt het leren dag uit het N.W. met nu en dan hevige stortregens. Van middag icht ik dat mijn huis om zou vallen, daar een groote boom op het dak il.

In de harde buien laat ik steeds de snelheid of kracht van den wind men, maar begin te twijfelen aan de goede aanwijzing van den anemometer. Et hoogste wat deze nog aangewezen heeft is 66, dat, volgens de formle, eene snelheid geeft van 6,6 M. in de seconde, overeenkomende met

het getal 3 van de schaal van Beaufort. Hierbij staat vermeld: "bewe de takken der boomen". Doch hier waaien groote boomen geheel o dus zal de wind wel heel wat krachtiger zijn, dan het instrument a wijst. Naar schatting zou ik dan ook aan de kracht het getal 5 gev Bij eene verificatie naderhand zal wel blijken of ik gelijk heb.

Ik voorzie wel, dat ik dit jaar niets meer zal kunnen doen, want l is heden nieuwe maan, en dan hebben we, zooals ik verleden jaar o opgemerkt heb, vooreerst nog geen goed weder te verwachten.

Kaarten teekenen is dan nu ook mijn werk. Bij hevige regens me ik dat evenwel ook staken, want mijn huis is niet waterdicht, zoochet er dikwijls even hard binnen regent als buiten.

Niettegenstaande de vele tegenspoeden is Klein-Key nu zoo goed gereed. Wel moet ik hier en daar nog zijn, doch stel dat uit tot moeson wat tot bedaren gekomen is. Die Westkust heeft mij heel w moeielijkheden berokkend, door het groote aantal kleine eilandjes en riffe

Vooral bij het zoeken naar laatstgenoemde had ik weinig hulp we de bevolking. Ik informeerde natuurlijk naar de ligging, maar me was niet gezind mij die aan te wijzen. Ik geloof dat men mij ni erg vertrouwde en dacht dat ik naar de riffen kwam zoeken voor ongemen. Op Groot-Key heb ik veel last met het te weten komen van onamen der bergen en ben daar ook nog niet achter. Vraag ik in eet negerij naar den naam van een daar dicht bij gelegen berg, dan gewe ze een naam op. In een volgende zeggen ze dat die berg geen naam heeft of noemen haar weer anders en zoo gaat dat door. De namen din Riedel voorkomen zijn voor het grootste gedeelte hier onbekend. Noop ik aan de Oostkust van Groot-Key daarvan beter op de hoog te komen.

Na de mail vertrek ik daarheen.

Zooals u uit de verantwoording zal blijken is het saldo nog f 1093. I Het reisgeld naar Batavia hier afgerekend, zou dit nog voldoende zij voor ± 1 maand. In dien tijd kan ik niet gereed zijn en het is dan or mijn plan eerst in Juli te vertrekken. Daar ik zuinig geweest ben, he ik hiervoor nog geld genoeg. Wel is waar moet ik alles nu zelf behat tigen, daar ik in geen 3 maanden eenigen steun van de firma Lange gehad heb, en hierop de volgende ook nog niet kan rekenen (hierove in een particulier schrijven meer), doch ik zie wel kans om met hetgee ik nog heb toe te komen.

Jammer dat het weder zoo dikwijls ongunstig geweest is, anders hat

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Tijdschr. v. h. Kon. Ned. Aardr. Genootschap. 1890.

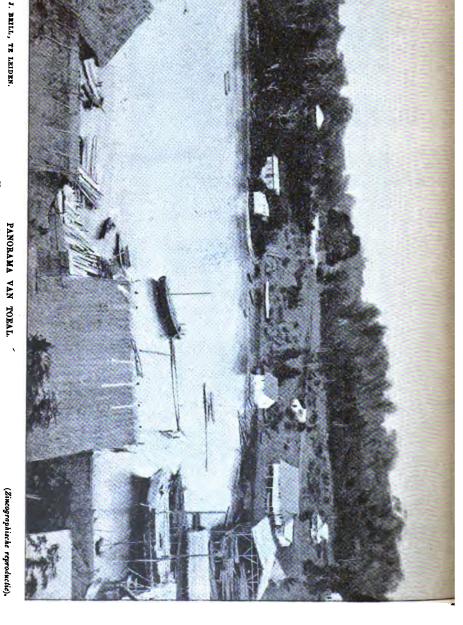


RAAD VAN TOEAL.

Naar eene photographie van H. O. W. Planten,

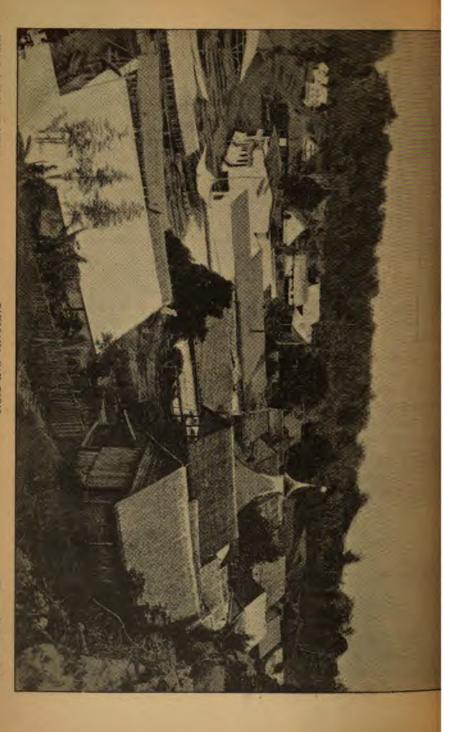
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PHRMA E. J. BRILL, TE LEIDEN.

Naar eene photographie van IL O. W. PLANTEN. PANORAMA VAN TOEAL. it vaarschijnlijk de hydrografische opneming al gereed gehad. De meterologische waarnemingen werden geregeld voortgezet. De instrumenten huden zich goed. Alleen twijfel ik aan den anemometer.

Veel ethnographische voorwerpen heb ik ditmaal niet gekregen. Op Icp-Tenimber had ik gedacht een goeden oogst te doen, doch de mensten waren zoo bang, dat ik niemand te spreken kon krijgen, noch mider in hunne huizen zoeken. De hoofden moest ik zelf bij hunne biederen uit huis halen, om naar het een en ander te informeeren. Met mei moeite heb ik nog hunne portretten kunnen maken. Ze stonden te beren als een riet, en zagen mijn toestel voor een mitrailleuse aan, ge-kof ik.

Het is anders een interessant eilandje en ik zal er dan ook nog eens kengaan, maar dan mijn vriend Bes medenemen. Dit is een voorname Keynees, slim en verstandig, die mij in alles helpt.

Met de vorige mail ontving ik van mijne familie cadeau een keurig photographietoestel met bijbehoorende ingredienten, als drooge platen enz. Dit kwam mij uitstekend te pas, want het toestel van den heer Langen was niet best meer en ook zijn de drooge platen van de expeditie bedorven. Hunne verpakking schijnt voor Indië niet geschikt te zijn, want ze zijn vochtig geworden. Ik krijg nu, voor een leek, heel aardige resulten. Als ik thuis ben is het ontwikkelen, afdrukken, enz. eene aangezame variatie op cijferen en teekenen.

Hiernevens zend ik u eenige proeven mijner kunst (?).

Na mijn laatste ongesteldheid ben ik weer even gezond als altijd. Buy maakt het ook uitstekend. Wij beiden verlangen hard naar beter weder om weer flink aan het werk te kunnen gaan.

Over 3 maanden hoop ik dan ook goede berichten te kunnen zenden en niet zulke jammerklachten als deze keer.

Met de meeste hoogachting

H. O. W. PLANTEN.

Bijlage M.

ToEAL, 29 Dec. '89.

Aan het Bestuur van het Kon. Nederl. Aardrijkskundig Genootschap.

Zooals ik de eer had u in mijn vorig schrijven te melden, had ik aan beheeren Mohrman te Macassar, als gevolmachtigden van den heer Langen, Eschreven of ik verder op hulp kon blijven rekenen.

Hierop ontving ik het volgende antwoord: "In antwoord op uw geach schrijven deelen wij UEd. Gestr. mede, dat ons van de overeenkomst tus schen de Key-expeditie en den heer A. Langen ten eenenmale niets be kend is, weshalve wij ons niet gerechtigd achten de gewenschte provisie enz. te zenden".

Hierop heb ik twee copieën van brieven van den heer Langen naar Ma cassar gezonden, waaruit aan genoemde heeren duidelijk zal blijken op wel ken steun ik recht heb, met verzoek om, wanneer ze zich nu nog niet ge rechtigd achten mij steun te verleenen, dan aan den heer L. in Europe telegraphisch machtiging te verzoeken.

Verder kan ik ook al niets doen. Nu verneem ik dat de heer L. spoe dig hier terugkomt en dan twijfel ik niet of alles zal wel terecht komen Ik houd dan ook van alle uitgaven aanteekening en geloof wel dat ZEd mij dat zal restitueeren. Van de f4000 blijft nog een crediet over van f1568,57.

Nog altijd heb ik de vrije beschikking over de kotter en een huis, er hiervoor mag ik waarlijk wel dankbaar zijn, want ik zou niet weten hoe ik het zonder de eerste zou moeten stellen.

Het spijt mij altijd dat de heer Langen zelf nimmer hier geweest is en ik daardoor altijd met zijn administrateur te doen heb gehad.

Het is nu een week geleden dat ik mijn verslag schreef en nog steeds is het slecht weer. Van daag had ik naar Doelan willen gaan om het een en ander met den posthouder te bespreken, maar ik kan nie wegkomen.

Het is te hopen dat het niet lang meer duren zal.

Ik houd mij nu maar bezig met allerlei bijzaken. Zoo heb ik sinds eenige dagen te logeeren een paar oude onvervalschte heidenen uit het bin nenland, die mij 's avonds in de geheimen van het heidendom inwijden Gisteren avond tot 1 uur heb ik mij zitten verdiepen in hunne tijdreke ning, waar ik maar niet goed van op de hoogte kan komen. Zoo heb ben ze onder anderen een maand die éen dag lang is, dus niet heel be grijpelijk.

Nu is hier gekomen als administrateur van den heer L., de heer Kuhn, een Duitsch zooloog, die vroeger als reiziger op Key geweest is en ool weet in welke betrekking ik tot zijn chef sta, maar hij kan mij niet helpen, omdat hij niets heeft. Ik geloof dan ook dat alles slepende gehouden wordt tot de terugkomst van den heer L., maar de Key-expeditie daarbij over het hoofd gezien is.

Wat ben ik blijde dat ik zuinig geweest ben, want ik zou waarlijk niet zame terugkomen zonder de opneming geheel volbracht te hebben.

Gelukkig ben ik geen pessimist en zie de zaken nooit donker in. Gewonlijk komt alles terecht en zoo zal het nu ook wel gaan. Alleen is åt lange slechte weder vervelend, want ik ben nogal onrustig van aard a kan niet lang in huis opgesloten zitten.

Misschien brengt het nieuwe jaar wel verandering mede.

Met de meeste hoogachting

Uw Dw. Dr.

H. O. W. PLANTEN.

Bijlage N.

(Schrijven van den heer B. van den Broek).

LARANTOEKA, 5 November 1889.

Reisverslag.

Een reis door de binnenlanden van Oost-Flores stond nog altijd op min programma. Wel had de heer Kleian, in gezelschap van den heer krich, indertijd een dergelijke reis ondernomen, hoofdzakelijk met het bel gegevens te verzamelen voor een volkstelling, doch van die reis taat geen verslag. Op de kaart Oost-Flores, door den heer Kleian gewakt en later door Resident Riedel gepubliceerd, zijn de toen bezochte mpongs aangegeven.

Na overleg met den heer Worms, civiel gezaghebber alhier, besloten in de maand September ons voornemen ten uitvoer te brengen, maat wij alsdan met de mailboot zouden kunnen terugkeeren.

Den 16den September vingen wij dan onzen tocht aan. Het plan was meg de Haddie-baai de noordkust te bereiken, en dan binnendoor naar kumerie te gaan. Ik had het geluk 2 uitnemende gidsen te krijgen, nl. vaccinateur, een ontwikkeld inlander en zijn vriend, een der voormatte leden uit de regeeringsfamiliën, die door hun werkkring overal bend zijn en volkomen vertrouwd met de vele dialecten van het Soloreesch Sikkaneesch, welke in de door te trekken rijkjes gesproken worden. Al spoedig bleek, dat van eigenlijke wegen nergens sprake is, en of-

schoon wij 16 koelies hadden medegenomen, hun werkkracht bleek zo weinig standhoudend, dat wij ook langs de noordkust het strand moeste houden. Alleen in Kroë, een landstreek tusschen de twee grootste riviere op deze kust, de Nanga-geteh en de Tali Boera gingen wij het geberg in, omdat de weg langs Tandjong Dara nog grootere moeielijkhede opleverde.

Ik zal geen opsomming geven van de verschillende stranden, die w passeerden, doch liever in het algemeen den indruk onzer reis weergeve De kust wordt telkens onderbroken door uitstekende bergruggen, daa door baaien vormende, die in het midden een zandig strand hebben. El zoo'n strand heeft zijn bezitter, hetzij een geheele kampong, of een it vloedrijk inlander. Zoo hebben de kampongs hier aan de kust, van Beblon af tot Kotta toe, elk hun strand aan de Noord- of Zuidkust van heiland. Wil zoo'n kampong handel drijven, dan gaat zij naar het habehoorende strand, en al spoedig komen de bergbewoners afzakken, ohun djagon, paddi, was, geelhout in te ruilen tegen katoen, sarong potten, matten en wat verder is medegebracht. Elk strand heeft evenze zijn aangewezen bergkampongs, die het komen bezoeken, zij erkenne het oppergezag van de kampong of het hoofd, die hen komt bezoeker en kennen aan hem vele rechten toe.

Een onzer gidsen heeft, als afstammeling uit de oorspronkelijke regeringsgeslachten alhier, een strand aan de Haddie-baai. Komt hij met zij volk daarheen, dan treedt hij als scheidsrechter bij onderlinge geschifk op, en heeft het recht gratis voedsel voor zijn volk te eischen. Het we een groote last voor ons, onze koelies aan het verstand te brengen, d zij in ons gezelschap niet mochten rampassen. Dit woord te vertalen do stelen of rooven, gaat in het gegeven geval niet aan, waarom ik h maleische woord liever verhollandsch.

De weg langs de Haddie-baai liep aanhoudend langs de kust. Neens moesten wij, soms een uur lang, reusachtige steenen overklauteres dan weder was het strand bedekt met een dikke laag rolsteenen. Et morgen moesten wij, om een kaap om te komen, meer dan 4 uren doch het water loopen, dat ons enkele malen ver boven de knieen kwam. Di het medenemen mijner meet-instrumenten mij groote moeite heeft gekos spreekt wel van zelf. Het meest werden wij, in dat begin onzer reis, ever wel geplaagd door gebrek aan water, en waar wij dikwijls onzen toch hadden willen staken, omdat de groote middaghitte het verdergaan bijn onmogelijk maakte, moesten wij dikwijls nog een goed uur verder, on een bron of klein beekje op te zoeken.

Langs de noordkust waren wij in dat opzicht gelukkiger. Men heeft der een paar flinke beken, en bijna overal bronnen.

Heeft men dan ook in het oosten van dit eiland in de buurt van den Imandiri een armoedigen plantengroei, en levert de landbouw weinig op, in de buurt Tandjong Dara, in Kroë, vindt men flinke bosschen en een seer loonenden djagon- en paddibouw. Op de eilanden langs de kust woont een visschende bevolking, die soms weken en maanden met het geheele huishouden in een "sampan" op zee blijft. De bodem zelf, maar sok de "adat" der bevolking, is oorzaak van den weinigen ondernemingsgeest der bevolking. Waar nu, zooals in de buurt van Maumerie, de bodem meer oplevert, hebben zich Boegineezen en Macassaren in een menigte lampongs langs het strand genesteld, en voeren de producten tot naar Singapore weg. Het strand bij Maumerie heeft dan ook een bedrijvig anzien. Tamarinden, pinangnootjes, kapok, djagon, maar vooral tabak worden hier uitgevoerd.

Het was na zeven dagen reizens, zes te voet en één in een beroq, dat wij te Maumerie aankwamen. Maumerie behoort tot het gebied van den Radja van Sikka, aan de zuidkust gelegen. Het eiland is hier, op de taart gemeten, ongeveer 3 uren gaans. De grens tusschen de rijken van Larantoeka en Sikka is niet juist aan te geven. Vooral aan de zuidkust maakt dat nog altijd een punt van geschil uit.

Te Maumerie was pastoor Calon zoo beleefd mij gastvrijheid te verkenen. Onze koelies vonden gelegenheid met een, door den vaccinateur voor zich aangekochte prauw, huiswaarts te keeren.

Nog onderweg zijnde, maakten de heer Worms en ik het plan terug be gaan per prauw naar Nanga-geteh of Wailamo en vandaar dwars door het eiland naar Conga. Mijn koelies waren evenwel zoo afgemat, dat ik de laatste dagen een prauw moest huren, om mijn goed daar te brengen. Beide onze gidsen zagen tegen een verderen landtocht op, mijn hijfjongen kreeg koortsen, en ik zelf bekwam, door het op den laatsten dag dragen van nieuwe schoenen, blaren aan de voeten. Lang te rusten ging niet, daar de heer Worms niet langer verlof had, en ging ik dus per mailboot op 28 September weer huiswaarts.

Van mijn verblijf te Maumerie maakte ik gebruik om een reisje te pard naar Sikka te maken. Reeds prof. Wichmann deelde daarvan een en ander mede; ik kan constateeren, dat hij niets te veel gezegd heeft van den slechten weg. Neemt men den kortsten weg door Kotti, waar pastoor IJsseldijk verblijf houdt, dan moet men 11 keeren dezelfde rivier doorwaden; gaat men meer westelijk over Pleat en Nita, dan loopt de

weg aanhoudend over smalle bergruggen. De kampongs die wij aantrof fen, maakten een gunstigen indruk; ruim en netjes zijn zij gebouwd kampong Kotti telt zelfs 100 huizen. Eigenaardig waren daar net ver sierde palen, die men er betrekkelijk velen vond en die voor "pomali' gehouden worden. Vroeger waren zij de steunpilaren van de woninger der voorouders. Men mag uit een vergelijking met de thans gebruikte afleiden, dat de bevolking in welvaart erg is achteruit gegaan.

Te Sikka was ik met mijn gezelschap, den heer Worms en den heer Sutherland, posthouder van Maumerie, de gast van pastoor le Cocq d'Armanville

De strijd tusschen Sikka en de Lioneezen, waarvan pastoor le Cocq bijna het slachtoffer geworden was, is nog niet ten einde, en het laat zich aanzien, dat het nog lang duren kan, tenzij de regeering beslist tusschenbeide trede. Voor een tweede Atjeh behoeft men niet bang te zijn, want moed is geen eigenschap van den Soloreeschen stam. Vooral het laatste gedeelte van den weg was halsbrekend werk.

Kampong Sikka is de zindelijkste en netste kampong, die ik in Indie nog gezien heb. De Radja van dit rijk woont er; juister zou het wellicht zijn pastoor le Cocq als het besturend hoofd te noemen. Vooral door zijn geneeskundige kennis, heeft hij grooten invloed.

Ten slotte nog een enkel woord over het hoofdproduct in deze streek, de tabak. De opbrengst is nog gering en blijft stationair, de bereiding is zeer primitief, het product is evenwel van uitnemende qualiteit. In hoeverre een geregelde exploitatie voordeel zou opleveren, durf ik niet te zeggen; ik acht de toestand der bevolking er nog niet rijp voor, terwijl invoering van vreemd werkvolk gevaarlijk zou kunnen zijn.

Veel heb ik op dit reisje gezien, veel ook gehoord, dat een latere vermelding overwaard is, en voor die mededeelingen en voor zijn geleide ben ik den grootsten dank schuldig aan den heer Worms. Aan hem ook had ik mijne uitstekende gidsen te danken.

De Civiel Ingenieur

R. VAN DEN BROEK.

aming van den Penningmeester van het Koninklijk Nederlandsch Aardrijkskundig Genootschap over het jaar 1889.

ONTVANGST.

Saldo.

Van vorige rekening	f 1949,22 ⁵						
Contributiën.							
Van 1 donateur f 100,—							
" I "							
" I "							
", 5 ", $\hat{a} f_{25}$,							
" I "							
$, 8 , \dot{a} f 15, \dots $							
" 1 donatrice							
"59 leden à f 12,— , 708,—							
"517 " " " 10,— · · · · · . " 5170,—							
" 1 lid (zes maanden)							
" 2 leden (zes maanden) à f 7,50 " 15,—							
$_{0}^{111}$, à f_{5} ,—							
" 1 donateur " 1,—							
	,, 6946,—						
Achterstallige contributiën.							
Van 2 leden contributie over 1888	,, 19,50						
Vooruit betaalde Contributien.							
Van 3 leden contributie over 1890	" 29,—						
Geleverde Werken aan Nieuwe Leden.							
Van opbrengst van vroeger uitgegeven geschriften aan							
tuwe leden geleverd	,, 3,—						
Honoraria.							
Van den uitgever volgens contract, honoraria van 68 ⁵ /8							
druks à f 30,— per vel f 2088,75							
	£ 80.46 70 ⁵						
Transporteere f 2088,75	7 0940,72						

Transport f 2088,75	f 8946,72
Van idem honoraria van 13/8 vel druks, die de jaargang 1888 meer bevat dan de toen ver- rekende 70 vel	
	,, 2130,-
Interessen.	
Van 1 jaar rente van f 4000.— Oblig. 4% Amst. Gemeente- Crediet	" 37 3 ,13
Geschenken aan het Genootschap.)) J13)-3
Van donatie van den heer Joh. J. C. Leyds te Pretoria £ 20.— f 12.10	
	,, 392,05
	f 11841,91
UITGAAF.	
UITGAAF. Onbetaalde rekeningen 1888.	
	f 621,81
Onbetaalde rekeningen 1888. Aan rekening der firma E. J. Brill te Leiden voor kaarten voorkomende in den jaargang 1888	f 621,81
Onbetaalde rekeningen 1888. Aan rekening der firma E. J. Brill te Leiden voor kaarten voorkomende in den jaargang 1888	f 621,81
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Onbetaalde rekeningen 1888. Aan rekening der firma E. J. Brill te Leiden voor kaarten voorkomende in den jaargang 1888	•

Transport f 771,81
Hervan, volgens contract met de firma E. J. Brill te Lei-
ta, voor goo Ex. à f 5.— f 4500.—
Aan kaarten in het Tijdschrift , 760.—
Am 200 overdrukken van het laatste gedeelte
m K. F. H. van Langen, Atjeh's Westkust . ,, 42.—
dan diverse geleverde overdrukken aan de
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Honoraria.
Am de schrijvers in het Tijdschrift , 2096,20
Algemeene en Huishoudelijke Vergaderingen.
Aan lokaalhuren, enz
,
Bibliotheek.
Aan bindwerk en aankoop van diverse boekwerken " 179,32 ⁵
Administratie kosten.
Aan diversen
Aan honoraria van geëmployeerden 500,
,, 989,285
Diverse Vilgaven.
Aan diversen
urticul
Saldo.
An nieuwe rekening
f 11841,91
Nagezien en goedgekeurd: Amsterdam, 31 December 1889.
(get.) H. BOUMAN. (get.) A. W. VAN EEGHEN,
" J. IJZERMAN. Penningmeester.

Bekening van den Penningmeester van het Koninklijk Nederlands Aardrijkskundig Genootschap betreffende de Wetenschappelijke Expeditie naar de Kei-eilanden.

ONTVANGST.

Saldo.		
Van vorige rekening	f	3735,
Diverse Ontvangsten.		
Van restitutie van telegramkosten	"	20,
·	f	3755,
•		
UITGAAF.		
Traktementen, enz.		
Aan dispositien der expeditie-leden op het Hoofd-Agent- schap der Nederl. Ind. Handelsbank te Batavia f 1988,68		
	f	2008,3
Passagegelden.		
Aan passage van den heer C. J. M. Wertheim van Batavia		
naar Amsterdam	"	600
Diverse Uilgaven.	"	600
Diverse Uitgaven. Aan commissie der NederlInd. Handelsbank voor gefour-	"	600
Diverse Uitgaven. Aan commissie der NederlInd. Handelsbank voor gefourneerde gelden, overvracht van bagage van den heer C. J.	"	
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Diverse Uitgaven. Aan commissie der NederlInd. Handelsbank voor gefourneerde gelden, overvracht van bagage van den heer C. J. M. Wertheim, enz	"	56,8
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LEST der kaarten, die ingekomen zijn in de Bibliotheek van het A. G., sedert de opgave in de Alg. Vergadering van April 1889 tot 1 Januari 1890. Zie Tijdschr. VI², Afd. B, bl. 457.

	Geschenk	YAD
In de Groote Topografische kaart, de volgende herziene		
bladen: Utrecht, Arnhem, Hattem en Almelo. d. Mi	in. v. W. I	H. en N.
n de Waterstaatskaart: N°. 1 van Uithuizen, Vierlings-		
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tot en met Olst. Voltooid waren reeds de bladen van		
de hoofdstroomen Rijn, Lek, Nieuwe Maas, Nieuwen		
Waterweg, en Mond van de Maas, Waal, Merwede,		
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tisschen St. Andries en Loevenstein	"	"
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den No. 248, 336, 337, 354, 355, 377, 378, 385,		
386, 426, 445 en 496 en N°. 338, 356, 379, 387,		
394, 412, 425, 433, 444, 446, 452, 464, 465, 485		
en 513. Van de 776 bladen dezer kaart ontving het		
Genootschap tot nu toe een 60 tal, van N. en Z.		
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Staatsspoorw. Buitenzorg—Titjalengka, in 16 bladen.	"	17
onden van de Eems, 1:50,000	Min. v.	Mar.
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mnen v. ankerplaatsen Wkust Sumatra, Blad I. Dito		
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N.Wkust Celebes van Hoek Dondo tot Stormenkaap.	"		19
N. kust Nieuw-Guinea van 133°—141° O. L. 1: 1,000,000	1)		12
Plannen van ankerplaatsen in den Molukschen Archi-			
pel, Blad IV	7)		79
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Kaart aanwijzende het emplacement van het Indisch	leger	, op	ı J
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Spoorwegkaart der Ver. St. van Noord Amerika. 1) Oost-			
en Middenstaten. 2) Westelijke, 1873		79	
Manitoba and the Northwestern territories of Canada.		"	
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der Nederlanden, in 62 bladen	"	12	,
Tooneel van den oorlog in het Oosten, 1854, (Grie-	••		
kenland, Turkije en Klein-Azie)	"	11	,
Tooneel van den oorlog in Polen en oml. landen	"	13	
Archipel en Zee van Marmora, 2 st., door v. Kingsbergen	"	17	
Platte gronden uit de vorige eeuw van de steden en			
vestingen Berlin, Prazg, Mainz, Luxemburg, Phi-			
lipsburg, Sebastopol en van de forteressen der tien			
Spaansche provinciën	17	"	
Trayectoria del ciclon de Septiembre de 1888 a traves	••		
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and Java, 1:350,000 4 bl. door Junghuhn, 1855	"	"
da- oder Borneo-Meere, Djava, Celebes, &c v. F.		
Berghaus, Gotha 1835	"	77
el Sumatra, (met kartons van de omligg. eilanden) d.		
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L. W. Beyerinck, 1852	"	"
st-Vlieland, 1756. — West-Terschelling, 1749. — De	• •	-
andplaat de Hors voor Texel, 3 verschillende krtn.		
1760—63 enz	"	"
bord-Holland verdeeld in de Hoog-Heemraadschappen		
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voorgesteld de verschillende toestanden in 1571, 1702		
en 1866, door J. F. W. Conrad	,,	,,
aart van het Koegras, door C. Visscher	"	"
haerte vande Wieringer waert dewelcke inden jaere xvic	.,	"
acht begost is bedyckt te worden, enz. door Adrianus		
Anthonii a° 1611	,,	,,
ykgraef en Hoogheemraetschap der zeeweeringen van den	"	•
Hondsbossche en Duynen tot Petten, bij Hendrik de		
Leth 1730	"	,,
ezelfde verkleind door Agge Roskam Kool 1782, met	"	"
aanduiding van de afneeming in 52 jaaren	,,	12
det Dykgraafschap van 't Ooster Baljuwschap van West-	"	"
Vriesland genaamt Medenblick en de Vier Noorder Cog-		
gen, door Hendrik de Leth		
rechterlandt en de Vier Noorder Coggen door Pieter Straat	"	"
en Jan Harge, gegrav. door Hendrik de Leth, 1736.		
aart der landen die hun water op Schermerboezem af-	"	"
voeren enz., te Haarlem bij Emrik en Binger, zond. jt.		
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	Стевси	EUK AN
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der-zee, door Jan Rood, bij Joannes van Keulen en Zoo-	70 11	٠.
nen, te Amst. 1773	Felix	ment
De Heer Huygenwaert met de omliggende dorpen, huysen, enz. door Anthonius Metius, 1631		
Alkmaarderhout, 1765	"	"
Haarlemmerhout, door Jan v. Varel, 1769	"	"
	17	"
Dito, door Dan. Engelman, 1797	"	"
Zuid-Holland met Utrecht, enz. 3 stuks divers 1791—96.	"	"
Gooilandt, door R. & J. Ottens	"	"
2 verschillende kaarten van de gecombineerde Niewkoop-	•	
sche plas, 1790	1)	"
't Ambacht van Berkel, Bleyswyk en Hillegersberg, Rott.		
1770	1)	"
Het Hooge Heemraadschap van Schieland, in Caert ge-		
bracht door Mr. Jan Stampioen, in Coper gesneden en		
Geteeckent door J. Vingboom, 1653	"	"
Het hooge Heemraadschap Crimpenre Waard; 6 bladen		
en 13 bl. met wapens der HH.raden, 's Grav. 1696.	"	"
12 verschillende kaarten betreffende de Merwede en de	••	
Nieuwe Maas of gedeelten daarvan, van de jaren 1739-79.	17	"
Oude Maas omtrent de Lint en Krabbe, door M. Bol-	"	"
stra, 1771		
Project tot ontlasting van de Lek langs den Diefdijk in	1)	".
de Linge, 1754	"	17
Ambachtsheerlykheyt van den Ouden Hoorn, 1697	"	17
3 krtn. van het Haringvliet, den Krammer en het Vol-		
kenrak of van gedeelten daarvan, 1781	13	"
Afbeeldinge van der stede en vrye heerlykheyt Heenvliet.		
J. Luiken fecit cum aqua forti, 1698	"	17
4 krtn. van het Graafschap Zeeland, van Jaillot, N. J.		
Visscher en J. Covens en Zoon	"	13
Zeeuwsche eilanden. Gedeelte van de kaart van Kraijenhof.	"	"
Het Sas van Gendt belegert den 28 Junij 1644, enz. On-		
deraan: Kort Verhael der gelegentheyt ende de belege-		
ringhe, enz. 't Amstelredam bij Claes Jansz. Visscher,		
1644	••	13

Geeche	nk van
Felix	meritis.
13	12
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	"
	Felix " " "

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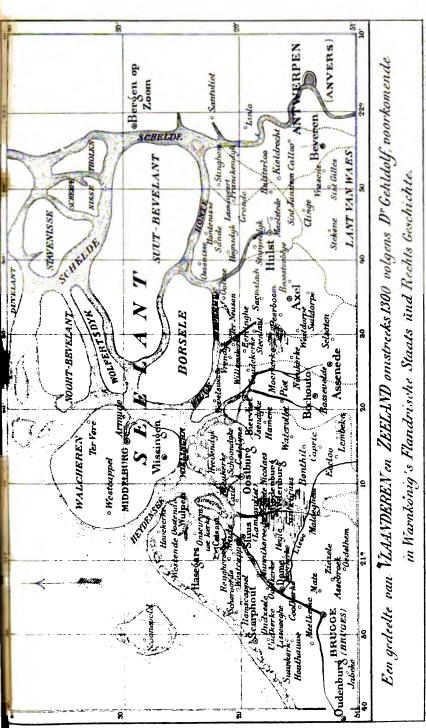
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¹⁾ Topografische kaarten van Nederland.

Tijdschr. v. h. Kon. Ned. Aardr. Gen. Meer uitgebr. Art. 1887.

verkend, en de aan de kadasterplannen ontleende minuutbladen door de aldus verzamelde gegevens aangevuld en verbeterd geworden, dan zon het gewenschte resultaat verkregen zijn en de topographische kaarten ten minste wat de detailteekening betreft, volkomen aan het doel beant woorden. Is dit dan niet geschied? — Wij kunnen deze vraag noch be vestigend, noch ontkennend beantwoorden, doch daarvan zijn wij over tuigd dat ôf de heeren officieren hun taak nu en dan wat al te lich hebben opgevat, ôf dat het werk somtijds aan minder ervaren terrein opnemers was toevertrouwd. Hoe is het anders verklaarbaar dat hier een grindweg 1000 meter te lang, elders een zandweg als kunstweg is in kaart gebracht, en zelfs de zoo hooggeroemde Chromo-Topographische kaart, 1:25,000, fouten van 500 meter kan aanwijzen?

Osschoon steller dezes gaarne toegeest dat het kadaster in vele, m. n. de goed bebouwde, streken van ons land waar hermetingen hebben plaats gehad zeer goed is, en dientengevolge aldaar ook de bladen der topographische kaart wel weinig te wenschen zullen overlaten, zij het hem echter vergund dit van andere bladen dier kaart te betwijfelen.

In den zomer van '89 werden de aan het hoofd van dit opstel genoemde Topographische- en Waterstaatskaarten door mij, voor zooverdit de Gemeente Winterswijk betrof, aan de werkelijkheid getoetst. Het resultaat van dit onderzoek was van dien aard dat ik besloot onderstaande op- en aanmerkingen aan de redactie van ons Tijdschrift aan te bieden. Achtereenvolgens zullen hier de grenzen, het terrein, de beken en waterleidingen met daarbij behoorende werken, het wegennet, de bebouwing van het terrein, enz. behandeld worden.

Grenzen.

Op elk der drie bovengenoemde bladen zijn de Rijksgrens alsmede de grenspalen aangegeven; alleen op de Chromo-Topographische kaart, I: 25,000, tevens die der Gemeenten, terwijl op de Waterstaatskaart daarentegen de grenzen der verschillende stroomgebieden en waterschappen voorkomen.

Aangezien Gemeentegrenzen voor een militaire kaart van waarde zijn met het oog op de onderbrenging en verpleging van troepen, moet het wenschelijk geacht worden dat deze alsnog op de Topographische en Militaire kaart, 1:50,000 worden aangebracht, temeer daar van de Chromo. Topographische kaarten op de schalen van 1:50,000 en 1:25,000, op welke kaarten deze grenzen voorkomen, nog slechts zeer weinig bladen verschenen zijn.

Terrein.

Op geen der bladen wordt dit door isohypsen voorgesteld omreden de niveauverschillen in dit gedeelte van het land betrekkelijk gering zijn. Men heeft derhalve de terreinshellingen volgens de eenigszins gewijzigde methode van Lehman in kaart gebracht, doch op de Topographische taart, 1: 50,000 en de Waterstaatskaart is dit zeer onnauwkeurig geschied, alleen op de Chromo-Topographische kaart, 1:25,000, is daarvan een reinig meer werk gemaakt. Terreinshoogten in meters AP. ontbreken powel op de Chromo-Topographische kaart, 1:25,000, als op de Topopaphische- en Militaire kaart, 1:50,000, doch worden op de Waterstaatshaart 1) in menigte aangetroffen. Een goede voorstelling van het relief van den bodem verkrijgen wij echter ook door deze kaart niet. De waterpasingen toch hebben bijna uitsluitend langs de spoor-, kunst- en voormamste zandwegen plaats gehad, terwijl de hoogte der tusschenliggende rreinen zelden bepaald werd. De hoogtepunten langs de spoorwegen erden overgenomen uit de lengteprofielen dier lijnen. Langs de Geldersch-Overijselsche Locaal spoorwegen zijn nog geen terreinshoogten aangegeven. reilmerksteenen en kruisbouten zoekt men op deze kaart tevergeefs, omeden deze ook op het terrein niet worden aangetroffen. Het gemis aan erkenmerken wordt voornamelijk gevoeld wanneer men met het een of nder doel een waterpassing moet uitvoeren. Wel wordt de plaats der erreinshoogte door het decimaalpunt aangegeven, maar deze kunnen toch ezwaarlijk als vaste punten beschouwd worden. Aangezien de waterpasingen langs de wegen werden uitgevoerd had men gemakkelijk de hoogte an het bovenvlak der in die wegen liggende bruggen kunnen bepalen, loch is dit zelden geschied. De eenige vaste punten, welke op blad Aalten 2 er Waterstaatskaart voorkomen, zijn de slagdrempels der molenstuwen; an deze toch zijn de hoogten boven AP ten behoeve der stuwpeilen epaald en in het randschrift der kaart vermeld.

De hoogten, welke op het blad voorkomen wisselen af tusschen 25,20 meter + en 49,60 meter + AP. Het verwondert ons derhalve dat wij p de bladen der topographische kaarten geen hoogtepunten aantreffen, emeer daar deze wel op andere bladen dier kaarten voorkomen en blad 35 (Lochem) der Chromo-Topographische kaart, 1:25,000, zelfs isohypsen an 20 meter, 23 meter, 24 meter, 30 meter, en 40 meter kan aanwijzen.

¹⁾ De meeste der op deze kaart voorkomende hoogtecijfers zijn bepaald door een reeks Daa kringwaterpassingen, uitgaande van verschillende hoogtemerken langs den rechter-Ditter van den Lisel.

Beken en waterleidingen met daarbij behoorende werken.

Wat deze betreft kan geen der kaarten op volstrekte nauwkeurigheid aanspraak maken.

Chromo-Topographische kaart, 1:25,000.

Op het blad Winterswijk zijn alleen de verschillende beken aangegeven. Van de Aaltensche- en Groenlosche Slinge is, voor zoover deze op het blad voorkomen, de carteering nauwkeurig; het beekje dat ± 100 meter boven de brug in de Willinkstraat in de Groenlosche-Slinge valt, ont breekt echter (fig. 3 en 4 a), terwijl de samenvloeiing der Henxelsche en Ratumsche beken, welke onder den naam van Henxelsche beek boven de stuw op de Ravenhorst in de Groenlosche Slinge uitmonden, geheel verkeerd is in kaart gebracht, n l. niet minder dan 500 meter te vernaan het westen verlegd werd (fig. 1 en 2). Het is bezwaarlijk aan te nemes dat hier een verkenning van het terrein heeft plaats gehad, want zelf een tourist, welke met een kaart gewapend, een wandeling langs de Henxelsche beek maakt, moet de geheel foutieve carteering terstond in het oog vallen.

Opmerkelijk moet het genoemd worden dat op het in 1881 herziem blad Aalten dezelfde fout begaan werd, doch dat deze op de in 1881 herziene uitgave dier kaart niet meer voorkomt.

De stuwen, welke ten behoeve van watermolens en bleekerijen in de beken geplaatst werden, zijn zeer onnauwkeurig gecarteerd; op verschil lende plaatsen ontbreken deze, terwijl zij daarentegen juist elders zijn aangebracht, waar ze op het terrein tevergeefs gezocht worden.

De stuw op de Ratumsche beek is o.a. ± 450 M. te ver naar be westen geplaatst (fig. 1 en 2), terwijl de stuwsluis bij Gossink op de Henxelsche beek, alsmede 2 van de 3 op de vereenigde Henxelsche beek geplaatste stuwen ontbreken. Ook de stuw op de Groenlosche Sling bij de Ravenhorst is niet in kaart gebracht.

Op de Aaltensche Slinge is 187,5 meter beneden de Huitinkbrug (eerst brug over die beek in den grindweg van Winterswijk naar Oeding) abt sievelijk een stuw geteekend, terwijl daarentegen de molenstuw van de Nieuwen molen, alsmede een verder stroomafwaarts gelegen stuw zij weggelaten.

Bruggen en duikers zijn over het algemeen juist aangegeven. Ook of de Topographische- en Militaire kaart, 1:50,000, treffen wij alleen de beken aan, doch deze zijn beter in kaart gebracht; alleen is de boven

DE VEREENIGIN G DER RATUMSCHE-MET DE HENXELSCHE BEEK

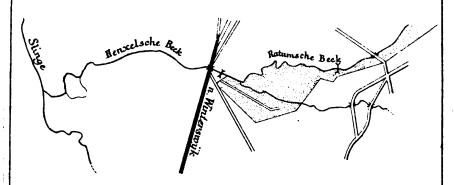


Fig1. Volgens de Chromo-Topogrkaart 1:25000.

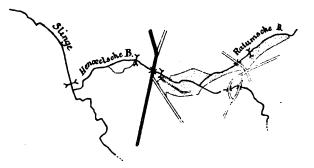
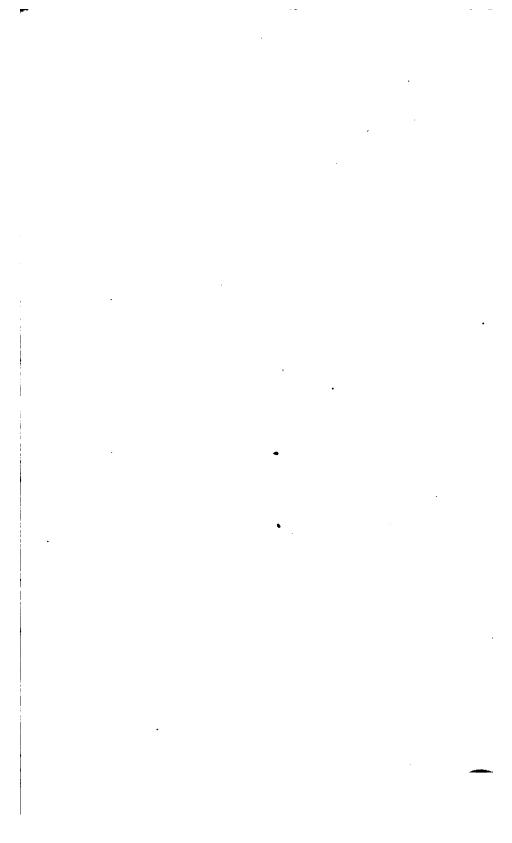
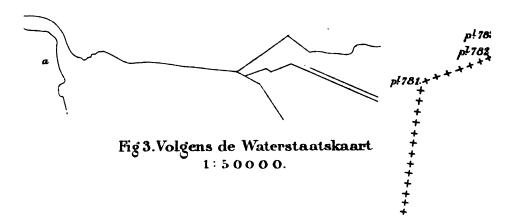


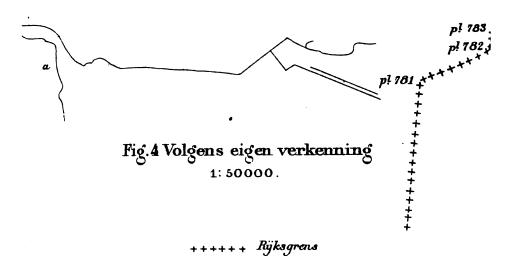
Fig. 2. Volgens de Waterstaatskaart 1:50000.

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loop der Groenlosche Slinge (Vosseveldbeek), niet ver genoeg doorgetrokken. Van stuwen, enz. wordt op de kaart geen vermelding gemaakt. De bruggen zijn juist aangegeven.

De Waterstaatskaart, waarop, zooals wij reeds gezien hebben, de grenzen der stroomgebieden en waterschappen (die van de Berkel en den Ouden IJsel) onderscheiden worden, geeft behalve de beken ook de voorheamste waterleidingen aan. Laat de carteering van eerstgenoemde over het algemeen weinig te wenschen over, die van de laatste is dikwijls minder nauwkeurig. Uit de hierbij gevoegde schetskaarten der Groenlosche Slinge boven het dorp Winterswijk blijkt dit o.a. voldoende.

De stuwsluizen zijn, op enkele uitzonderingen na, nauwkeurig in kaart gebracht. De derde stuw op de vereenigde Henxelsche beek ontbreekt, evenals die op de Aaltensche Slinge beneden den Nieuwen molen.

Slechts van 3 stuwen, n.l. van de molenstuw op de Aaltensche Slinge, van den Nieuwen molen, de molenstuw op die beek van den Plekenpolsmolen en de stuw op de Groenlosche Slinge bij de Ravenhorst (vroeger een watermolen), worden de wijdte in den dag, de hoogte van den slagdrempel boven AP., alsmede de bij besluit van Gedeputeerde Staten vastgestelde stuwpeilen in het randschrift der kaart vermeld. Duikers ontbreken evenals op de Topographische en Militaire kaart, 1:50,000, bijna preral, en de bruggen mochten wel wat duidelijker zijn aangegeven.

Wegennet.

Spoorwegen en Stations.

Op alle kaarten zijn deze juist aangegeven, behalve op de Waterstaatskaart, waar de Geldersch-Overijselsche Locaal-Spoorwegen als nog in aankg zijnde (in stippellijnen) voorkomen. Op laatstgenoemd blad ontbreken evens het station van dien spoorweg te Winterswijk, alsmede de halte m Miste.

Overwegen.

Bij het gebruik der Chromo-Topographische kaart, 1:25,000, verkeert nen meermalen in het onzekere of deze bestaan, dan wel of vroeger aanvezige wegen vervallen zijn. De spoorwegen zijn op dit blad n.l. voorseteld door twee evenwijdige lijnen en alle de baan kruisende of daaregen doodloopende wegen tot aan deze doorgetrokken. Op het terrein aan een dergelijke teekening dikwijls tot verwarring aanleiding geven.

Praktisch zou het zijn wanneer de overwegen door een overeenkomstig

teeken op de kaart aangeduid (zie fig. 5), of wel de spoorwegen evenals op de Topographische en Militaire kaart geteekend werden.

Op laatstgenoemde, alsmede op de Waterstaatskaart zijn tevens de bermen van den spoorweg geteekend. Overwegen worden daarop tot aan de rails, doodloopende wegen tot aan den berm doorgetrokken. Op de bladen dezer kaarten is echter een fout begaan door ook particuliere en derhalve steeds gesloten overwegen als kruising in kaart te brengen. Door een eenvoudig teeken had dit op de kaart kunnen worden kenbaar gemaakt (fig. 6).

Grindwegen.

Op de Topographische kaart, 1:50,000 en de Waterstaatskaart is de grindweg van Winterswijk langs het Scholtenhuis in Ratum ± 1850 meter, die van eerstgenoemde plaats door het Woold naar Scholte Roerding 2030 meter te kort.

De kunstweg van Winterswijk door het oostelijk gedeelte van het Woold is echter ongeveer 1250 meter te ver doorgetrokken.

Dit is mede het geval met den grindweg van het dorp in de richting naar Meddeho en wel over een afstand van ± 475 meter.

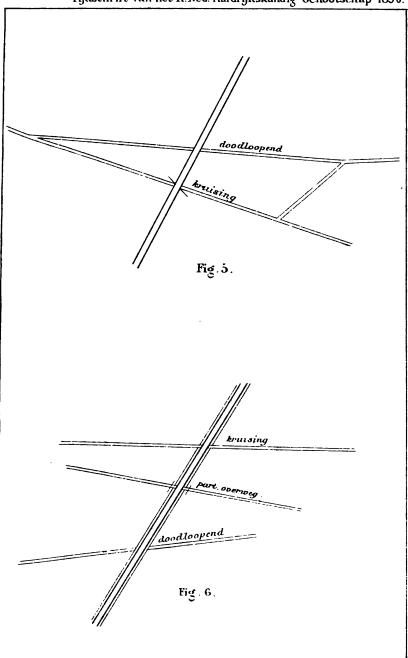
De grindweg van de halte Miste (G. O. L. S.) naar den grindweg van Winterswijk naar Bredevoort (tegenover den Meenkmolen), lang 1390 meter, ontbreekt op alle kaarten.

De zoogenaamde parallelweg, een zandweg, welke aan de zuidwestzijde van het stationsemplacement gelegen is en den grindweg naar het Woold met dien naar Bredevoort verbindt, staat op alle bladen als kunstweg vermeld.

De grindweg naar Ratum werd in 1886—87, over een afstand van 2465 meter, verlengd tot aan het Scholtenhuis en in het volgend jaar nog 455 meter verder doorgetrokken. In eerstgenoemde jaren onderging ook de grindweg door het westelijk gedeelte van het Woold een verlenging van 2030 meter tot aan Scholte Roerding. Aangezien het blad Aalten der Topographische kaart in 1887 herzien werd, moesten de nieuwe kunstwegen, met uitzondering van het in 1888 begrinde gedeelte, reeds op dat blad voorkomen, evenals de grindweg naar de halte Miste, welke mede in 1886—87 werd aangelegd.

Uit de hier aangehaalde cijfers blijkt tevens, dat de grindweg naar Ratum oorspronkelijk ongeveer 1070 meter te ver was doorgetrokken. Op de Chromo-Topographische kaart, 1:25,000, is de lengte van den grindweg in de richting naar Meddeho, alsmede van dien door het oosten

Tijdschrift van het K.Ned. Aardrijkskundig Genootschap 1890.



FIRMA E.J.BRILL TE LEIDEN .

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van het Woold nauwkeurig aangegeven. Voor de overige kunstwegen geldt hetzelfde als voor de Topographische- en Waterstaatskaarten, 1:50,000.

Zandwegen en voetpaden.

Op de Chromo-Topographische kaart, 1:25,000, zijn deze over het algemeen zeer nauwkeurig gecarteerd, zoodat wat dit betrest, blad Winterswijk n°. 496 geheel voldoet aan de eischen eener goede militaire kaart.

Niet onvoorwaardelijk kan dit gezegd worden van de Topographische en Militaire kaart des Rijks, 1:50,000. Moge ook de carteering der hoofdwegen over het algemeen weinig te wenschen overlaten, die der kleinere zandwegen en voetpaden is maar al te dikwijls zeer onnauwkeurig en meermalen totaal onjuist. Een smal, bijna onbegaanbaar voetpad vindt men nu en dan op de kaart als een breeden zandweg vermeld. Elders moet een gecarteerde weg te vergeefs op het terrein gezocht worden. Op de eene plaats is te veel, op de andere te weinig in kaart gebracht.

Dezelfde onnauwkeurigheid en fouten biedt de Waterstaatskaart, doch hier maakt de lichtpaarsche tint van den onderdruk het geheele wegennet, met uitzondering der kunstwegen, zoo onduidelijk dat het meermalen noodzakelijk is op het terrein tevens een topographische kaart te raadplegen.

Bebouwing van het terrein.

Voor zoover dit in een streek, waar om zoo te zeggen dagelijks heidevelden ontgonnen worden, de boschcultuur steeds toeneemt en telkens een dennenbosch verdwijnt om voor eiken plaats te maken, mogelijk is, kan het blad Winterswijk der Chromo-Topographische kaart bijna op volstrekte nauwkeurigheid aanspraak maken. Slechts een enkele grove fout merkten wij dan ook op, n.l. bij de samenvloeiing der Ratumsche- en Henxelsche beken, gelijk uit bijgaande schetskaarten 1 en 2 blijken kan. Op blad 496 der kaart worden tuinen, bouwgronden, weilanden, dennenbosschen, eiken- en beukenbosschen, kreupelhout, heidevelden met en zonder opslag, enz., onderscheiden.

Minder nauwkeurig en voorzeker veel onduidelijker zijn in dit opzicht de Topographische en Waterstaatskaarten, 1: 50,000.

Hoeven, verspreide huizen, enz.

Hoewel de spelling der huisnamen uit den aard der zaak niet altijd even juist is, zijn deze over het algemeen toch vrij nauwkeurig in kaart gebracht.

Ook hierin staat de Chromo-Topographische kaart, 1:25,000, bovenaan. Op de Topographische- en Militaire kaart, alsmede op de Waterstaatskaart worden de groote Scholteplaatsen noch door teekens, noch door schrift van de kleine hoeven onderscheiden; nu en dan worden de laatste zelfs in groot, staand schrift vermeld, terwijl de uitgestrekte bezittingen Roerding, Lintum, Tenkink, Esselink, enz. nauwlijks leesbaar zijn aangeteekend en de Scholteplaatsen Willink en Meenk maar in het geheel niet in kaart werden gebracht.

Na op eenige fouten, welke de besproken kaarten aankleven, opmerkzaam gemaakt te hebben, kan ik toch niet nalaten aan diezelfde kaarten een woord van lof toe te brengen. Allen, welke evenals de schrijver meermalen zoowel de Topographische- en Militaire kaart des Rijks, 1:50,000, als de Topographische Karte der Rheinprovinz und der Provinz Westfalen, 1:80,000, in het veld moesten raadplegen, zullen het met mij eens zijn dat het voordeel ontegenzeggelijk aan onze zijde is. Waar mogelijk maakte ik zelfs in het westen van Westfalen steeds gebruik van de grensbladen Aalten 41 en Groenlo 34, op welke bladen gedeelten van het naburige Rijk voorkomen. En nog onlangs bleek mij tijdens de in uitvoering zijnde grondboringen naar steenkolen nabij Lunten in Westfalen, dat verscheidene der ons aangewezen hoeven op blad Groenlo voorkwamen, terwijl de Sect: Coesfeld der Topographische Karte von der Rheinprovinz und der Provinz Westfalen slechts een dier punten kon aanwijzen. Doch de topographische kaart moet zijn een getrouw beeld der aardoppervlakte, en op dien naam kunnen ook onze kaarten nog geen aanspraak maken. Plicht van den geograaf is het op hem bekende minder juiste voorstellingen opmerkzaam te maken, niet met het voornemen de Nederlandsche Cartographie af te breken, doch met het uitsluitend doel deze te bevorderen.

Op deze wijze en met behulp der nieuwe, thans in uitvoering zijnde primaire en secondaire driehoeksmetingen kunnen onze topographische kaarten eens worden wat zij zijn moeten: — een voorbeeld voor andere natien.

EEN NIEUW WERK OVER NEDERLAND.

Nederland en zijne bewoners. Handboek der Aardrijkskunde en Volkenkunde van Nederland, met kaarten en afbeeldingen, door Dr. H. Blink.

Naarmate in deze eeuw de wetenschap een breedere vóórkennis en bechtere basis van de beoefenaars harer verschillende takken vorderde is het aantal dilletanten, vooral in Nederland, op duidelijke wijze afgenomen. Bezitters van natuurkundige kabinetten of werkplaatsen, van privaat observatoria zijn hoogst zeldzaam. Twee vakken, wier oorsprong wel is waar in een mythisch verleden ligt, doch welke eerst sedert luttele tientallen van jaren in de rij der exakte wetenschappen zijn opgenomen: weerkunde en aardrijkskunde stellen schijnbaar minder lastige eischen aan hare beoefenaars. Waarschijnlijk is dit de reden, waarom op beider terrein nog een menigte dilletanten zich bewegen.

Verre zij het van mij met geringschatting te willen nederzien op hen, die een wetenschap uit liefde tot haar, per il loro diletto, beoefenen. Integendeel zullen zij de studie eer grondig en met ernst om haar zelfs wil, ten amore kunnen opvatten, dan iemand wien slechts het geld of bijkomende zaken trekt. Maar aldus is de kwestie niet zuiver gesteld. Hij, die door de beoefening van een tak van wetenschap zijn brood verdient, is niet als loondienaar tegenover den liefhebber te stellen. Veelal liggen de verhoudingen omgekeerd. De mannen van het vak gaan con amore te werk. Zij zijn dilettanten per il loro diletto. De buiten het vak staanden menigwerf de schrijvers om aanzien of geld.

Behalve de schijnbaar geringere eischen, vooral op mathematisch en natuurkundig gebied, welke de voornaamste hulpwetenschappen van weerkunde en aardrijkskunde zijn, is er nog een andere grond, waarom deze wetenschappen meer algemeen domein schijnen te zijn.

Beide worden in de eerste plaats bevorderd door waarneming, daarnaast door verwerking dezer en niet allerminst door een innige verbinding van het in de werkelijkheid en inden geest aanschouwde. Vooral op het terrein der waarneming, deels ook op dat der verwerking bewegen zich de buiten het vak staande liefhebbers. Op het gebied der weerkunde blijft het meest bij eigen waarneming, waarop men zich dan, gewoonlijk slechts monde-

ling, tot kenner der wetenschap verheft. Op aardrijkskundig terrein zijn de liefhebbers met eigen waarneming zeldzamer, wellicht omdat hiervoor, behalve de moeite van het reizen, reeds een grondiger voorkennis gebiedend is. Daarenboven beperken zij zich niet tot mondelinge uitingen. Het schrijven van hand- en leerboeken is in deze wetenschap oogenschijnlijk gemakkelijker en daarbij, wijl het een algemeen verbreid schoolvak is, tevens loonender.

Aan ieder handboek kan een dubbele eisch gesteld worden: overplanting en vermeerdering van kennis of wetenschap. Dit laatste geschiedt door aan het voorhandene uit eigen geesteskracht iets toe te voegen. De overplanting kan compilatorswerk zijn; doch velen bedenken niet, dat de boeken, die zij daarvoor bezigen eveneens door compilatie verkregen zijn. "Wie de geographie van een land naar bronnen en kaarten construeeren wil, zegt Dr. Supan 1), oefent in de eerste plaats een ordenende werkzaamheid uit, dus datgene wat als karakter der leerende werkzaamheid te bestempelen is."

Hoe gemakkelijk dus schijnbaar het eerste deel, het compilatorswerk, zich voordoet, zoo blijkt zulks geenszins gering te schatten. Bronnen bijeenzoeken, bronnenstudie zijn op zich zelf niet licht; maar kritiek, Urtheilskraft, esprit de discernement is een niet zoo alledaags voorkomende geestelijke verdienste dan men wel zou meenen.

Na bronnenstudie is de eisch het land en volk, waarover men een handboek schrijft, in persoon te bezoeken, om een algemeen oordeel van beide te verkrijgen. Aan het voorhandene zal men hierdoor dikwijls weinig of niets toevoegen, men zal echter zijn bronnen leeren verstaan en met meer inzicht met meer vrijheid weten te gebruiken.

Zonder zelf te zien, hetzij met het lichamelijke, hetzij met het geestelijk oog is geen vermeerdering van kennis mogelijk. Beide land en volk moeten door eigen aanschouwing bekend zijn, wil de schrijver de stof beheerschen kunnen.

Hetgeen door hem gezien is en hetgeen zijn bronnen hem na zifting opleveren, moet verwerkt worden; het causaal verband tusschen de meest uiteenloopende factoren moet hij doorgronden. Eerst dan is hij in staat een beeld van land en volk te ontwerpen aus einem Guss, een gieteling, waarin ook nieuwe belangrijke gezichtspunten hun plaats kunnen vinden en waaruit ongekende feiten aan den dag treden.

In de tweede plaats kan men de uitgave van een handboek nog als

¹⁾ Petermanns Mitth. 1889 VIII p. 158.

volgt beschouwen. Het handboek moet goedkoop zijn, want afgezien van de waarschijnlijke gevoeligheid van schrijver en uitgever voor pecuniaire voordeelen, is het van het hoogste belang, dat het werk, wanneer het een goed is, binnen ieders bereik valt. Zoo ontstaat voor den schrijver de vraag: wat op te nemen, wat weg te laten?; allerminst geve hij herhalingen.

Bij de beantwoording dezer vraag kan men eensdeels uitgaan van de eischen der wetenschap, die wij in het kort hebben toegelicht, ten andere kan men de aandacht vestigen op de koopers. Deze laatsten kunnen nu op het oog hebben eene vermeerdering hunner kennis, zonder meer, of een dergelijke aanwinst in verband met examens. Uit beider standpunt wordt vereischt een basis breed en vlak door zijn eenvoud, waarop zij met zekerheid hunne schreden kunnen zetten, allerminst een oppervlak ruw en rotsig met verwarrende kleinigheden overladen, zoodat de lezers de kluts kwijt raken en niet meer weten, waarover de schrijver op dat oogenblik handelt.

Voor beiden moet het doel van het boek een stevig houvast zijn, waarop zij zich voor verdere studies kunnen verlaten. Allerminst verlangen zij een gemengd assortiment van feiten, zelfs niet al zijn deze alle belangrijk of nuttig.

De schrijver beschouwe den geest der lezers niet als een pakhuis, zelfs niet zijn boek als geheugenoefening voor de lezers, maar hij vordere een voortdurende aandacht met een gebruik van logisch denken. Maar met zooveel te meer recht verlangen zij, dat deze eischen bij den schrijver tijdens de bewerking hebben voorgezeten.

In deze eeuw van steeds toenemende snelheid bij en in alles, schijnt ook bij het schrijven in de eerste plaats de regel: doe het snel, goed als het kan, maar vóór en ten koste van alles snel. Kan het dan nog verwonderen wanneer gedachten zoo zeldzaam worden? dat de schrijvers zich blijkbaar den tijd niet gunnen hun werk te rangschikken, laat staan te lezen? Hoevelen schrijven tegenwoordig als een architect bouwt naar een vooraf vast beraamd plan. Wel geven zij vooral bij inteekenwerken een plan op, maar reeds zoo menigwerf werden de inteekenaars van deze prospectussen de dupe, dat hunne beteekenis moeilijk te bepalen is.

Om over de waarde van een boek een voorloopige schatting te maken is het niet noodzakelijk te weten, waarover of wat de schrijver gedacht heeft. Immers zou daartoe noodig zijn, al datgene te lezen, wat hij geschreven heeft en in 't geval van compilatiewerk, aldatgene hij als zijne bronnen opgeeft. Het is voorshands genoeg te weten, hoe hij gedacht

heest. Van dit "hoe" zijn stijl, indeeling en rangschikking ee 1 zuivere afspiegeling.

De waardebepaling van Dr. Blinks werk kan, wijl het nauwelijks is aangevangen, slechts een voorloopige zijn. In hoeverre het aan de hierboven kort toegelichte en zeker met bilhijkheid te stellen eischen voldoet, zij hem met aandrang zelf ter beoordeeling overgelaten. Wij meenen, dat indien hij zelf tot een toetsing van zijn reeds verschenen arbeid overgaat, op sommige punten, maar ook in de geheele behandelingswijze nog plaats is voor verbetering, waarvan, daar verreweg het grootste gedeelte nog moet verschijnen, de volgende afleveringen nog ruimschoots de vruchten kunnen plukken.

Immers van de op blz. XII vooropgestelde indeeling in 10 onderafdeelingen zijn nog geen twee verschenen, terwijl een derde (407 blz.) van den begrooten omvang reeds gebruikt werd. Op dergelijke wijze voorgaande worden de inteekenaars, evenals die op "de Waterbouwkunde", tot zeer veel grootere kosten genoodzaakt. Herhalingen zijn altijd overbodig en zeker dus onder deze omstandigheden. Op bl. 12 en vlg. vindt men echter de mededeelingen der Romeinsche schrijvers over de oude riviermondingen, die op blz. 363 weerkeert en volgens blz. 405 nog een derde maal te wachten is.

Hier betreft het nog een bron, doch wat te zeggen van herhalingen van algemeenheden. Vermoeiend is soms het woord orographisch, dat op achtereenvolgende blzn. telkens 5 à 6 maal voorkomt. Somwijlen komt een zeer gewichtig punt eerst op het einde van het behandelde ter sprake, zoo b. v. bij de verplaatsing der waterlijn op blz. 30 in verband met blz. 23. Of het aldaar sub II opgegevene "door verandering van de hoogte van een gedeelte van het strand" niet duidelijker uitgedrukt ware door van positieve en negatieve of zee- en landwaartsche verschuiving der waterlijn te spreken, vooral in onderscheid met het dalen op blz. 30?

De historische ontwikkeling onzer kust wacht blijkbaar nog later een uitvoeriger behandeling. Het nu geleverde is te fragmentarisch. Over de kustlijn benoorden den Helder wordt, met uitzondering van een weinig van Texel, gezwegen.

Bronnen zooals de belangrijke opstellen in de V. K. I. I. 55/56 en 57/58 (overzicht der geschiedenis van Goeree door P. Caland) en de bekroonde verhandeling van Van Nierop bleven onvermeld, daarentegen wordt voor een algemeenheid, die weinig of niets met het onderwerp te maken heeft, Bluntschli's Staatslehre geciteerd. De bronnenopgaaf is veelal overstelpend, maar toch worden kaarten weinig of niet daarvoor opgegeven. Welk een

gebruik, om bij de eerste onderafdeeling te blijven, zou te maken zijn van kaarten als b. v. Cruqius kaart van den Maasmond, de door Ged. St. van N.-Holl. uitgeg. en door J. F. W. Conrad samengestelde kaart van Huisduinen (1571, 1702, 1866) of van Egmond (1686, 1718, 1864)! Nergens wordt gewag gemaakt van aanwinst in vorige eeuwen langs de kust, evenmin van den dijk, welke Eijerland en Texel verbindt, noch van dien, welke den Helder aan N.-Holland vastlegde, welken laatste de schrijver b. v. in de prototype van zijn werk: le Francq van Berkhey's Nat. Hist. van Holland p. 89 reeds had kunnen vinden.

Een conclusie zooals aan het einde van dit hoofdstuk, dat de duinen afname in Zeeland geringer geweest is dan verder noordwaarts kan slechts uit onvoldoende bronnenkennis verklaard worden. Het verlies b.v. van Wulpen en Scooneveld zou, behalve dat er natuurkundige gronden voor grooter verlies zijn aan te halen, reeds een andere beslissing wettigen.

Het lag hier voor de hand om iets uit eigen geest toe te voegen, om èn uit historische feiten èn uit de metingen in deze eeuw verricht, aan de hand der vermoedelijke oorzaken, een algemeen beeld der strandverandering te ontwerpen.

Over het tweede onderdeel A, is het wegens den onvoltooiden toestand moeilijker een voorloopig oordeel te vellen. In 't algemeen treft de ongelijke behandeling; naast bepaald verdienstelijke historische behandelingen zoo b. v. die der Linge, staan andere b. v. de verbinding tusschen Maas en Waal die op blzn 96 en 397 ter sprake komt. In 't oog springt de behandeling brokstuksgewijze, welke bepaald hinderlijk is bij de verandering, welke de Rijn aan de Nederlandsche grens heeft ondergaan.

Behalve de paragrafen met algemeene beschouwingen stuit men ook op algemeen waterloopkundige hoofdstukken, zoo b. v. op enkele bladzijden na van pag. 193—260, die voor een groot deel minder op zijn plaats zijn in een aardrijkskundig handhoek van Nederland, maar dan toch zeker achter de afdeeling D rivieren op blz. 52 dienden geplaatst te worden. Te meer daar § 11 p. 231 zeker § 2 p. 150 moest voorafgaan.

Veelal wordt een te groote menigte waterstaatkundige details gegeven; vooral in tabellen, hoewel de tafels op blzn 158 en 352 duidelijker zijn dan vele woorden.

Een definitie als op blz 56 is zeker niet fraai, daarbij overtollig, omdat de eerste regels van blz 57 hetzelfde uitdrukken. Of Thomsons gedachten op p. 238 juist zijn weergegeven? Met genoegen zagen wij deze echter vermeld. Fig. 3 kan slechts dienen om onjuiste voorstellingen van Nederlandsche rivieren te veroorzaken.

Evenmin dunken ons de voetnoten in de inleiding met het begrip functie, zelfs indien de toelichting juist is, iets tot verklaring te kunnen bijbrengen.

Het bovenstaande bevat slechts enkele aanstippingen, omdat wij, zooals gezegd, des schrijvers eigen oordeel aan de hand der inleiding het meest vruchtdragend achten voor het nog te verschijnen gedeelte.

Over het geheel is den schrijver veel lof te brengen voor den noesten ijver, waarmee hij de geschiedkundige gegevens bijeen heeft verzameld.

Kritische zisting dezer, rangschikking, eigen oordeel, weglating van herhalingen of overtollige details kan de waarde van zijn arbeid slechts verhoogen.

Moge een goede uitslag het loon zijn van Dr. Blink's groote vlijt.

E2.

DE LITTERATUUR OVER NEDERLANDSCH INDIE SEDERT JULI 1889.

DOOR

Prof. Dr. C. M. KAN.

Hebben wij in ons artikel over de reizen en publicaties der Nederlanders op geographisch gebied in de 19de eeuw, aansluitende aan vroegere overzichten 1), de boven genoemde litteratuur tot Juli van het vorige jaar kunnen vervolgen, wij meenen geen onnut werk te verrichten, wanneer wij thans, in aansluiting aan het overzicht van de vermeerdering onzer kennis van den aardbol, door den heer Timmerman geleverd, de publicaties over Insulinde tot Juli 1890 de revue laten passeeren. Wij zullen daarbij weder de gewone volgorde in acht nemen, en, na de bespreking der werken en tijdschriften over Indië in haar geheel, die over de afzonderlijke eilanden laten volgen. Voor de volledigheid vermelden wij soms ook nog enkele publicaties van het jaar 1888.

I. INDIË IN HAAR GEHEEL.

Openen wij dit overzicht met nieuwe uitgaven op bibliographisch gebied, dan hebben wij de aandacht onzer lezers te vestigen op het feit dat, haast de uitvoerige en grondige besprekingen der koloniale litteratuur, door Jhr. Mr. J. K. W. Quarles van Ufford sedert jaren op zoo verdienstelijke wijze in de Economist²) geleverd, en naast de overzichten, daarvan ten

^{. 1)} Proeve eener geographische bibliographie van N. O. Indie voor de jaren 1865—1890 (Niet in den handel), Utrecht 1881, op verschillende bibliotheken aanwezig; Cablogus der koloniale Tentoonstelling te Amsterdam, Groep I, Klasse I; Revue Coloniale internationale 1885 en 1887; de reizen der Nederlanders en de voornaamste publicaties op geogr. gebied in de 19de eeuw, Tijdschr. Aardr. Gen. N. S. 1889, p. 510.

2) In den jaargang 1888, p. 255—278, worden besproken: de N. Ind. Mij. van Nijv. en Landb. en haar Tijdschrift; wijlen de Indische Mail en de Revue Coloniale Inter

behoeve van Nederlanders in de Indische Gids en in ons Tijdschrift voorkomende, thans ook in het buitenland daarvoor zorg wordt gedragen, dat die zoo verspreid liggende litteratuur over Nederl. Indie voor de lezers van verschillende tijdschriften bijeen gebracht wordt. Geschiedt dit met meer of min uitvoerige bespreking van de belangrijker werken of artikelen in Petermann's Mitteilungen 1) en, in alphabetische volgorde der namen van

nationale"; Dr. Wijnmalen's "Les Possessions Neerlandaises dans les Antilles"; de Indische Mercuur; de Indische Gids en de Bijdragen van het Statistisch Instituut. In den jaargang 1889, p. 174—193, besprak de heer Quarles: Mr. Brooshooft's Memorie over den toestand in Indië; de voordrachten der Hoogleeraren de Louter en van der Lith in het Indisch genootschap; het zoutmonopolie; de jongste geschriften van Mr. N. P. van den Berg; H. A. de Groot's Studie over rijstprijzen; voorts (p. 796—816) Dr. C. Snouck Hurgronje, "Mekka" en andere geschriften. In den jaargang 1890, p. \$18—284, bespreekt hij: De Antropium bond, De Indische Tolk en het Koffierapport.

1) In Petermann's Mitteilungen 1889, (Heft IV en VI) Litteraturbericht nº. 849 ca verv. en 1338, en 1890 (Heft I) no. 51 en verv., worden meer of minder uitvoerig besproken de volgende werken en artikelen, ten deele reeds vroeger door ons verneld: Schuiling's -De grenslijn van Wallace, eene continentale grens"; Kan's -Bodengesteldheid der eilanden en diepte der zeeën van den I. A."; Wilken's Jets over de schedelvereering bij de volken van den L. A."; Wijnmalen's Statistisch Overzicht van N. I. en de Jaarcijfers over 1887; Langen's -Atjeh's Westkust"; Corn. de Groot's »Herinneringen aus Blitong"; P. J. Veth's "Verspreiding van dieren op de Batoe-eilasden"; Treub's Notice sur la nouvelle flore de Krakatau"; J. Brandes' «Kine Jayapstité van Çaka 849"; H. Tonkes' "Volkskunde von Bali"; H. Zondervan's "Timor en de Timoreezen"; G. Langen's . The key or ke islands" (in de Proc. der R. G. S. 1886; p. 764); Posewitz' .Borneo''; A. Piton's .Un voyage à Borneo'' (Serawak); Tromp's "Eene reis naar de bovenlanden van Koetei"; Th. Posewitz' "Das Gebirgsystem Ber neo's"; F. S. A. de Clercq's "Het eiland Wink of Biak"; A. Bastian's "Indonesies" (Borneo and Celebes); Jentink's »Eenige bemerkingen betreffende de zoogdieren besproken door Schuiling"; van der Kemp's »Resumé van gewestelijke rapporten over di kunstnijverheid in N. I."; Helfrich's »Bijdrage tot de geogr., geol. en ethnogr. 146 nis der afdeeling Kroë"; Easton's »Geol. onderzoek van den omtrek der Brandewij baai"; Judd's "The earlier Eruptions of Krakatau"; Guppy's "The geological struct of the Sindang Barang District on the South Coast of Java"; de »Observations mi at the magnetical and meteorological Observatory at Batavia"; Verbeek's »De oudhed van Madjapahit in 1815 en 1887"; Kruseman's »Eenige dagen bij de Badoewis" van Ende's »Die Baduwis auf Java"; Easton's «De vulkanen Sitong en Pando ter W terafdecling van Borneo"; Sydney Hickson's »A Naturalist in North Celebes"; Schelle's "Verslag over het voorkomen van goudvoerende aderen bij Sumelatta (** dentie Menado) en van een onderzoek naar de waarde van bekende goudvindplaateen de afdeeling Gorontalo"; Meijer's »Album van Celebes-Typen"; Graafland's »Het eila Rote" en »Aunteekeningen op ethnographisch gebied" over dat eiland; Van Hoëvel Key-, Tanimber-, Timorlacet-eilanden, afdeeling Bahar, Leti- en Arce-eilanden.

de auteurs in het VI Heft der verschillende jaargangen van het Zeitschrift für Erdkunde, voor Müllers "Orientalische Bibliographie" 1) is die vermelding onder het hoofd "Malaien" u. s. w. opgedragen aan de nauwlettende zorg van Dr. Th. Ch. L. Wijnmalen, terwijl ook in Engeland een publicatie begonnen is, waarin voor zulke overzichten betreffende de Nederlandsche koloniën plaats zal kunnen gevonden worden 2), zooals de heer Metzger die in zijn belangwekkende "Notes on the Dutch East Indies" in the Scott. Geogr. Magazine van 1888 gevonden heeft. Ook dienen wij aan het slot dezer rubriek te vermelden, dat in 1887 en 1889 vervolgen op den Catalogus van de boeken en kaarten der bibliotheek van het Ministerie van Koloniën zijn verschenen, die niet enkel als bibliographiën kunnen dienst doen, maar tevens bewijzen, met hoeveel zorg deze bibliotheek wordt aangevuld en haar Catalogus wordt ingericht en bijgehouden 3). Verschaft deze publicatie ons een geleidelijken overgang tot verdere uitgaven van Regeeringswege, dan zullen wij niet weder stilstaan bij de Koloniale Verslagen en den Regeeringsalmanak, waarop wij, om hun voor de geographische kennis van Indië zoo belangrijken inhoud, reeds zoo herhaaldelijk de aandacht hebben gevestigd 4), noch op het Jaarboek van het Mijnwezen 5) en de Sammlungen des geologischen Reichsmuseums 6) zu Leiden, die ook voor het door ons besproken jaar zoovele belangrijke bijdragen bevatten. Liever wijzen wij er op, dat ook nu weder de resultaten der magnetische waarnemingen, zooals zij te Batavia, en der meteorologische, zooals zij voor den regenval, op stations over den geheelen Archipel verspreid, werden verricht, op voortreffelijke wijze werden gepublicerd 7); dat door den Hydrographischen Dienst de uitgave van een groot

¹⁾ Berlin, Bd. I-III, 1888-'90.

²⁾ Torch (The) and Colonial Book Circular. Including classified Lists of new publications — English, American and Colonial — in all Departments of Literature, Science and Art., London Petherick 1889 II.

³⁾ De Catalogus zelf verscheen te 's Hage in 1884; het eerste vervolg in 1887, het

⁴⁾ Zie Revue Col. Intern. I (1885), p. 50. 5) 18de Jaarg., Amst. 1889.

⁶⁾ De Sammlungen bevatten voor 1888: Ichthyosaurus von Ceram; Neue WirbelThierreste von Pati-Ajam auf Java; Ueber das Vorkommen einer Rudisten führenden
Kreideformation in S. O. Borneo; Recherches sur la flora pliceène de Java; voor 1889:
Die Fanna der Kreideformation von Martapoera. — Een andere belangrijke publicatie op
mineralogisch gebied voegen wij hieraan toe, n.l.: Gesteenten en mineralen van N. O. I.

I. Tin, door D. de Loos, Uitgegeven door de N. Mij. van Nijverheid, Haarlem 1889.

⁷⁾ Observations made at the Magnetical and Meteor. Observatory at Batavia. Vol IX (1888), Bat. 1889; Regenwarnemingen in Ned. Indië, 10de Jaargang (1888) door J. P.

aantal nieuwe en verbeterde kustkaarten met ankerplaatsen werd bezorgd, waarop wij bij de afzonderlijke eilanden zullen terugkomen; dat van wege het Ministerie van Marine voor de uitgave van een "Lichtenlijst in Ned. O. en W. Indie" 1), alsmede voor het verschijnen van het zoo vele belangrijke reisverslagen bevattende "Jaarboekje der Kon. Nederlandsche Zeemacht" 2) gezorgd werd.

Aan deze publicaties van Regeeringswege willen wij hier eenige andere op nautisch-hydrographisch gebied vastknoopen, wij bedoelen: Baron P. T. van Heerdt's "Atlas van de waarnemingen in den Indischen Oceaan"), evenals de "Routes der stoomschepen van Aden naar N. Indie") voor onze zeevarenden van zoo groot gewicht; voorts het verschijnen eener nieuwe editie van Findlay's bekende Directory 5) en van een geheel nieuw werk op dit gebied de "Chronicle and Directory for China, Corea") enz., zich ook met Borneo en de Malay-States bezighoudende 7). —

Wij traden door het noemen der laatste werken reeds op het terrein der algemeene beschrijvingen en der reizen door grootere gedeelten van den Archipel. Zijn de laatste uit den aard der zaak zeldzamer en bepalen zij zich tot enkele publicaties, die van de hand der HH. Adriani , Jacobsen , Bassler 10, Senn van Basel 11) e. a., niet onbelangrijk is het

van der Stok, Uitgegeven op last der N. I. Regeering, Batavia, Landsdrukkerij 1889 ('s Hage Mart. Nijhoff). Zie ook de meteor. waarnemingen en die over vulcanische verschijnselen in het Nat. Tijdschrift van N. I. 1889.

^{1) &#}x27;s Hage 1889; p. 46-61 N. O. Indië; 62-68 W. Indië.

^{2) 1887—88, &#}x27;s Hage 1889, Verrichtingen der Kon. N. Zeemacht in W. Indië, p. 491—523; in O. Indië p. 523—'55; 1888—'89 Verricht. in W. Indië p. 275—303, in O. I., p. 308—349.

⁸⁾ Met 22 gekl. platen en verklarenden tekst in 't Nederl. en Fransch, Amst. 1889.

⁴⁾ Routen voor stoomschepen tusschen Aden en N.O. Indië. Uitgeg. door de afdeeling Zeevaart van het K. N. Meteor. Instit., Utrecht 1888.

⁵⁾ A. Directory for the navigation of the Indian Archipelago etc. With descriptions of the Winds, Monsoons and Currents, 8d Ed., London 1889.

⁶⁾ The Chronicle and Directory for China.... Borneo, Straits Settlements, Malsy States etc. Coloured Maps. Hongkong 1889 en 1890.

⁷⁾ Voor de noodige statistische gegevens betreffende handel en scheepvaart zorgt het Departement van Financien door zijn statistiek van den handel, de scheepvaart enz. (voor het jaar 1887) Bat. ('s Hage) 1889.

⁸⁾ P. Adriani, Herinneringen uit en aan N.O. Indië 1877-1882, Loppersum 1889.

Op Jacobsen's reizen komen wij bij de bespreking van de Molukken en kleine Soenda-eilanden terug.

¹⁰⁾ A. Bässler, Reisen im Mal. Archipel, Z. f. Ethnol. XXI 2, p. 120.

¹¹⁾ Onze Oost. Tijdschr. v. N. I. 1888 en '89.

aantal werken, dat in den laatsten tijd ten behoeve van het onderwijs verscheen en waaronder vooral de Atlas van den heer Bruins, de schetsen van den heer Leendertz en het reeds vroeger door ons genoemde werk van den heer Schuiling onze aandacht verdienen 1).

Bewegen de schrijvers dezer werken zich op elk onderdeel der geographische wetenschap, wij hebben ten slotte nog vele bijdragen tot de vermeerdering onzer kennis dier onderdeelen te vermelden. Zoo begon Prof. Weber de uitgave der resultaten van zijn zoölogische reis ²), Dr. J. G. Boerlage zijne beschrijving van de Nederlandsch Indische Flora ³), en werden behalve over den plantentuin te Buitenzorg ⁴), merkwaardige bijdragen geleverd tot de kennis van verschillende cultures of der daaraan knagende ziekten ⁵), terwijl ook weder in het zoo verdienstelijke weekblad "de Indische Mercuur" en in den bij denzelfden uitgever verschijnenden Cultuur-almanak ⁶)

l) A. Doeleman, Onze bezittingen in Oost en West. Een leerboek voor L. en M. cederwijs, inzonderheid voor Kweek- en Normaalscholen, Breda 1888; P. Bruins, Mederland en Insulinde. Een School- en handatlas in 16 bladen voor hoogere inrichtingen van onderwijs enz., Groningen 1889; D. Aitton, Nederl. O. en W. Indië, de dr., Groningen 1889; H. Hasper, De nederl. bezittingen in O. en W. I. en Palestina, Amersfoort 1889; C. J. Leendertz, Van Atjehs stranden tot de Koraalrotsen van Mieaw-Guinea. Schetsen uit Insulinde. Met 5 gekl. platen, Arnhem 1890; L. A. E. van der Ley, Nederland en zijne overzeesche bezittingen. Bekn. Aardr. Leerboekje met 2 baarten. Idem Atlas 13 kaarten, Amst. 1890.

Zoölogische Ergebnisse einer Reise in Niederländisch Ost-Indiën, 1° Heft. Mit
 Karten, 18 Tafeln and 4 Zincographiën, Leiden 1890.

³⁾ Handleiding tot de kennis der Flora van de families en geslachten der N. I. Phanerogamen. 1e dl. 1ste stuk. Met voorrede van M. Treub, Leiden 1890.

⁴⁾ M. Treub, Verslag omtrent den staat van 's Lands plantentuin te Buitenzorgenz.

ever het jaar 1888, Bat. 1889. Wij meenen hier ook melding te moeten maken van

den Catalogus der bibliotheek dier inrichting, waarvan het vorige jaar (1889) het eerste

explement verscheen.

b) F. Soltwedel, De serehziekte, Samarang 1889; H. J. E. Peelen, Sereh, hare geardheid, hare oorzaken en de middelen te harer voorkoming, Batavia 1889; N. J. Straick, Opiumpacht of opiumrégie?, 's Hage 1889; Gouvernements koffiecultuur. Rapport van de Staatscommissie ben. bij K. B. van 14 Oct. 1888, 's Hage 1889; W. Burck, Over de koffiebladziekte en de middelen om haar te bestrijden, Amst. 1889; D. R. Greve, Hoe de koffiebladziekte het eerst in Indië werd waargenomen. Ind. Gids 1889, p. 1851; J. C. Brouwer, Suikerziekte van het suikerriet, Soerabaja 1889.

Indische Cultuur Almanak. Vierde jaargang 1890, Amsterdam 1889. Zie daarover Ind. Gids 1889, p. 417. Handboek voor Cultuur- en handelsondernemingen in N. I.
 Jaarg. Amst. 1889. Een nieuw tijdschrift verscheen op dit gebied: Teijsmannia, Red. H. J. Wigman, Hortulanus van 's Landsplantentuin. 1e Jaarg., Bat. 1890.

alles werd bijeen gebracht, wat op die cultuurgewassen zelve, de daaraan verbonden industrieën en de daardoor in 't leven geroepen maatschappijen betrekking had. Vooral in den Cultuur-almanak worden daaraan zeer vele practische wenken verbonden.

Wat de bevolking van Ned. Indie betreft, de Heeren Bastian 1), Wilken 2) en anderen 3) gaan voort van anthropologie en ethnographie hun ernstige studiën te maken; de Heeren Kielstra 4), van der Chijs 5), Louw 5) en Heeres 7) verschaften voortreffelijke bijdragen tot de kennis der geschiedenis van verschillende tijdperken en onderdeelen van den Archipel; over de verschillende godsdiensten, meer bepaald den islam tegenover het christendom 8), het boeddhisme 9) en voorts over het zendingswezen 10) in Ne

¹⁾ Bastian, Indonesien oder die Inseln der Mal. Arch. Lfrg 4. Borneo und Celebs, Berlin 1889.

²⁾ G. A. Wilken, Albino's in den Ind. Archipel (Bijdr. Inst. 1890, Afl. 1).

³⁾ A. Langen und R. Virchow, Berichte und Individualaufnahmen aus dem Mal. Archipel (Z. f. Ethnol. XXI, 2, p. 123). In de Ind. Tolk v. h. N. v. d. Dag, n°. 17, gaf de Heer W. F. Andriessen zijne studie over de Chineczen in onze Oost, in de Vragen v. d. Dag, III, p. 502, de Heer W. H. Senn van Basel over den Inlander in den Ind. Archipel.

⁴⁾ E. B. Kielstra, Sumatra's Westkust van 1833—35. (Bijdr. Inst. 1889, 2—4), 1886—40 (id. 1890, 2); Bijdr. tot de geschiedenis van Borneo's Westerafdeeling (Ind. Gids. 1890) en Bijdr. tot de geschiedenis van Palembang (Ind. Milit. Tijdschr. 1889).

⁵⁾ N.I. Plakaatboek 1602—1811 door J. A. van der Chijs, Vo Deel, 1743—1750, VI. 1750—54. Uitgeg. door het Bat. Gen. van Kunsten en Wetensch., met medswerking van de Ned. Ind. Regeering, Bat. 1888. — Dagh-register gehouden int Casteel Batavia van 't passeerende daer ter plaetse als over geheel N. I. Anno 1659 en 1666. Uitgegdoor het Bat. Gen. v. K. en W. en onder toezicht van Mr. J. A. van der Chijs, Bat. en 's Hage 1889.

P. J. F. Louw, De derde Javaansche Successie-oorlog 1746—1755. Uitgeg. door het Bat. Gen. v. K. en W., Bat. 1889.

⁷⁾ De opkomst van het Nederl, gezag in O. I. Verzameling van onuitgegeven stukken uit het oud Koloniaal Archief. (Ook onder den titel: Bouwstoffen voor de geschiedenis der Nederlanders in de Mal. Archipel) Deel II (Buitenbezittingen), na den dood van Dr. P. A. Tiele uitgegeven en bewerkt door Mr. J. E. Heeres, 's Hage 1890.

⁸⁾ A. H. K., De Hadji's in Ned. Indië: Stemmen voor Waarheid en Vrede, 1888, p. 1155; N. D. Schuurman, Welken invloed oefent de Islam uit? Met een naschrik door E.; H. van Leeuwen, St. voor W. en Vrede, 1888, p. 729; Hadji's, Priesters consorten op Java, 1839, p. 17; H. Smeding, Over svolkomen vrijheid" van godsdiesstige belijdenis voor de inlanders van den O. I. Archipel, enz. id. 1888, p. 1054; W. F. Andriessen, De Islâm in N. I., Vragen van den Dag, IV, p. 219; J. G. Schot, Moslemen en Christenen, Ind. Gids, 1889, p. 901 en 1525; Arminius, Iets over hu-Zie vervolg noot 8), 9) en 10) op de volgende blz.

erl. Indie en op de verschillende eilandengroepen verscheen een buitenewoon groot aantal artikelen. Tevens werd, meer dan vroeger, aan de

elijk en echtscheiding bij de inlanders, de daaruit voortvloeiende inkomsten der Mommedaansche geestelijkheid en de administratie der Moskee-fondsen, Ind. Gids 1889, 1501 en 1652; L. W. C. van den Berg, Huwelijken tusschen personen behoorende verschillende categoriën der bevolking van N. I., Med. Zendelingg. XXIII, p. 825; L. De Mohammedaansche broederschappen in N. I., Tijdschr. van N. I. 1889, II, p. ; Th. Delprat, Viering van het Moharram- of Hassan Hoesseinfeest, Eigen Haard 39, p. 480.

9) De verhouding van het getalcijfer der Boeddhisten tot dat der overige godsdienstlijders, Med. Ned. Zend. XXXIII, p. 457.

10) P. van Wijk Jr., De Roomsche zending in onze Koloniën. Ned. Zendingst., I, 36; Th. Ch. L. Wijnmalen, Cijfers en feiten op het gebied der Zending. Een toemak. Uitgegeven ten voordeele van de Nederlandsche gereformeerde zendingsvereeging, Amst. 1889; Zendingstijdschrift (Nederl.), uitgegeven door het Comité voor Nerl. Zendingsconferentiën onder redactie van P. van Wijk Jr., Utrecht 1839; J. C. surdenburg, Overzicht van het Zendingsveld in N. I., id, I, p. 83 en 245; Missive n Z. E. den Minister van Koloniën dd. 8 Mei 1888 tot het Ned. Zendinggenoothap etc., Med. XXXIII, p. 336; J. Kreemer, De zending op Oost-Java, 8e dr., met n voorwoord van Mr. O. J. H. Graaf van Limburg Stirum, 's Hage 1889; M. Brour, Oost-Java en de Minahassa, St. v. Waarheid en Vrede 1888, p. 960; W. Hoezoo, woonten en gebruiken der Javanen bij gelegenheid van eene zons- en eene maansrduistering, Med. Ned. Zend. Gen. XXXIII, p. 376; Verslag aangaande mijne werkambeden en bevindingen in 1887 en '88, id., p. 426; C. Poensen, De Zending in ediri en Madroen, Med. Ned. Zend. Gen. XXXIII, p. 408; B. C. Roosen, Die Mis-Ms-Kolonie Mergaredja auf Java, Evang. Missions Magaz. Nov., p. 448; Munson und rman, Zwei Blutzeugen Christi auf Sumatra oder die Anfänge der Mission unter den ttas. Barmen 1889 (Rhein. Missions-Traktate, N°. 36). De vrijheid der Protestanthe kerken in N. I., 's Hage 1889; Leben und Sterben einer Missionarstochter aus rneo, 2te Aufl., Barmen 1889 (Rhein. Missions-Traktate, No. 28); H. Rooke, Beth nopens den voortgang der Evangelisatie in de Minahassa over 1987, Med. Zend. XXIII, 1, p. 48; J. Esser Weil, Statthalter von Timor.... über seine Missionsitigkeit in Holland in Indiën, Ruhr 1889; M. Buys. Isak Busmond, Een schets uit Ambon'sche Christenleven, Ind. Gids 1889, p. 806; J. L. van Hasselt, Nieuwhines en de N. I. Regeering, St. voor W. en Vrede 1888, p. 156; J. ten Hove, Eene Indreis op Noesalaoet, Med. Zendelinggen., XXXIII, 1, p. 16; Eerste indrukken evaringen op het eiland Savoe. Uit de brieven van den Zendeling Ph. Bieger, Med. #delinggen., XXIII, 2, p. 127; J. Louwerier, Eenige opmerkingen omtrent het Inadsch onderwijs, Med. Zendelinggen. XXXIII, 2, p. 176; J. J. van Toorenenbergen, bezwaren tegen de Zending onder de Papoea's van de zijde der natuurwetenschap, ederl. Zendingsst. I, p. 9; N. Graafland, Het eiland Rote, Meded. Zendelinggen., XXIII, 3, p. 289; A. F. P. Graafland, Eenige aanteekeningen op ethnogr. gebied nanzien van het eiland Rote (Med. Zendelinggen., XXXIII, p. 351; A. Kruyt, Verontwikkeling der kunstnijverheid 1) de noodige aandacht geschonken, terwijl ook tot de kennis van den gezondheidstoestand der bewoners en de in onzen Archipel heerschende ziekten nieuwe bijdragen werden geleverd 2).

II. SUMATRA.

Wat het eiland Sumatra betreft, zoowel door de triangulatie als door de spoorwegwerken werd de topographische kennis van dit eiland uitgebreid en het kaartenmateriaal aanzienlijk vermeerderd (Zie over de eerste de vorige aflevering van dit tijdschrift, pag. 344 en verv.). Ook de Hydrographische Dienst zorgde voor vele nieuwe en verbeterde kustkaarten ³), waarop vooral de vele kartons der ankerplaatsen ⁴) op de Noord-, Oost- en Westkust de aandacht verdienen.

Voorts zagen, als naar gewoonte, vele beschrijvingen van belangrijke

- 1) P. H. van der Kemp, Résumé van gewestelijke rapporten over de kunstnijverheid van N. I., Bat. 1889; Comte de Pourtales, ancien consul de France à Batavia. Représentation de l'industrie française aux Indes Neerland., Paris 1890; F. Driesen, Tie and dye work manufactured at Samarang, Arch. f. Ethnogr. II, 8, p. 106.
- 2) P. Adriani, De tropische infectie-ziekten, Leeuwardan 1889. (Overgedr. uit bet Nederlandsch Militaire tijdschrift 1888); C. A. Pekelharing en C. Winkler, Ondersock naar den aard en de oorzaak der beri-beri en de middelen om die ziekte te bestrijdse. Utrecht—'s Hage 1888; A. Oppel, Der Gesundheitszustand der Europäer im malaischen Archipel (Ausland 1889, No. 18, p. 241).
- 8) Westkust van Sumatra van Roesa tot Melaboe; Noordkust van Sumatra van Betoe Poetih tot Diamantpunt; N.O.-kust van Sumatra, van Piamantpunt tot boek Tamiang, van hoek Tamiang tot de Broeders, allen 1:250,000 Hydr. Bureau, Bat. 1889; Oostkust Sumatra, Geul der Palembang of Moesi-rivier 1:40,000.
- 4) Plannen van ankerplaatsen op de Westkust van Sumatra, Bl. I en II, Hydr. Bereau te Batavia 1889. Op deze kaart komen de volgende reeden, baaien ens. voor, waarachter het jaar der opname gevoegd is: Kroeng Raban-baai (1885), Sidoh-basi (1881), Lamboesi-baai (1888 en 84), B. van Ketapan Pasir (1884), Reede Tapoes (1840), R. Ajer Bangies (1833), Riouw en Lehong-b. (1889), Belimbing-b. (1877), Reede Beroes (1859), R. Tikoe (1839), R. Taboejong (1836), B. v. Tapanoeli (1840), R. Troemon (1841), R Bengkoelen (1856), R. Natal (1839), R. Batahan (1839), R. Priaman (1834), Sambat-b. (1771), Tenambang-b., Reede Padang en Brandewijns-baai trigonom. opgenomen (1888). Sipora Oostkust (1888), Boenga-baai (1860), Nias R. Sitoli (1853), Siberoet, B. v. Tabekat (1859), Noord Pageh Simanganjoe-baai (1856), Z. Pageh. Ankerplaats op de Oostkust, Simaloe Sinabang b. (1881), Simaloe. Vaarwater tussches Gr. en Kl. Simaloe (1878 en '80), Zuid Pageh Laboean Djaoe-b, Sipora Oostkust, B.

slag van den werkkring Mödjô-wamo over 1888, Med. Zend., XXIII, 3, p. 297; J. Kruyt, Verslag van den Zendeling te Kendel Pajak over het jaar 1888, id, p. 278; H. H. Meulenbelt, D. J. van der Linden als Zendeling op West-Java, Nederl. Zendingst, I, p. 224.

kustgedeelten, als Atjeh 1), Deli 2), Indragiri 3) en Kroë 4) het licht, terwijl ook over de naburige eilanden, Nias 5) en Engano 6), soms zeer uitvoerige werken gepubliceerd werden.

v. Semebaai (1859), verbeterd 1888, Zeebloemstraat (1859), verb. 1886 en 1888, Sibereet. Simalapeh en Siberoet-baai (1858), Simaloe, B. van Tapak 1881, Nias, B. van Slaka 1847, B. van Engano (1868), Sipora Oostkust, B. van Sioeban (1888), Str. Sikaap (1853), Sipora, Hurlock-b. 1750, Siberoet, B. van Siloegoei 1869, Batoe-eil, R. Tello 1886, Engano, ankerplaats bij Barohia, Noord Pageh Silaboe Laboe-b. 1849, Kakee-eil. Ankerplaats bez. Nakoe (1881). — Keloeang-b. (1871), Raja-str. (1834), Rigae-b. (1834), verb. tot 1888, R. Pati (1873), Daja-baai (1886), Boeboen-b. (1873), verb. tot 1878, R. v. Telok Keloempang (1876), verbeterd tot 1885, R. Laboean Hadji, Makih-b. (1832), R. Koealoe Batoeh en Soesoeh (1827, 30 en 31), R. Soesoeh, verb. 1881, B. v. Melaboeh (1834), R. v. Tampat Toean (1881), Engano, Ankerplaats bij thet eiland Kahek (1838), Zuid Pageh Veeckens-b. (1889).

Plannen van ankerplaateen en riviermondingen op de N. en O. kust van Sumatra Bl. I. Bat., Hydr. Bureau 1890. Met volgende baaien en riviermondingen, waarachter bet jaar der opneming gevoegd is: Eil. Beras (1877), Eil. Weh Balahan baai (1880), R. Oleh-leh (1875), Kroeng Rajah b. Mondingen Segli en Pedirrivier (1880), Saban-baai (1888), Mond der Endjoenriv. (1877), Mond der Atjehrivier (1884), der Tjang-boel (1885), der Simpang Olim (1875), der Langsar (1876), der Radja Toea (1882), Beede Lok Semawe (1880), R. Edi Rajoet (1885), Mond der Edi Rajoet. M. der Bengalang (1876), Mond der Pantjoer (1884), der Djamboe Ajer (1876), der Aroe-boeder (1876), der Tamiang (1871—72), der Raja (1885), N. O. kust van P. Bras Lambaleh b. (1874), Nasi O. kust Rotsbaai (1885).

- 1) Zie v. Langen's Beschrijving dier Westkust, in dit Tijdschrift, VI, (1889). Afsendsrlijke vermelding verdient hier het Atjeh-Album. 10 photogr. af beeldingen uit Atjeh naar opnemingen door wijlen den officier van het O.-I. leger, S. Bonga, photographisch uitgevoerd door H. W. Wollrabe Jr., met tekst van G. E. V. L. van Zuylen. 's Hage 1889.
- 2) Overzicht der tabaksondernemingen op de Oostkust van Sumatra, Deli, Langkat, Serdang, Padang, Bedagei, Assahan, Batoe Bahra en Siak. Amsterdam 1889. De tabakscultuur in Deli. Met pl. en platte gronden. Amst. 1889, J. T. Cremer, Delische febetsen, Eigenhaard 1889. Aanteekeningen betreffende eenige kleederdrachten in de afl. Seloema (Res. Benkoelen) en voorwerpen van de eilanden-groep Engano af komsig. Not. Bat. Gen. 1889. Afl. I, Bijlage I en II.
- 3) A. F. P. Graafiand, Schetsen uit Indragiri, Batavia 1889, en idem, De verbreiding van het matriarchaat in Indragiri (Bijdr. Instit. 1890, 1).
- 4) O. L. Helfrich, Bijdr. tot de geogr., geol. en ethnogr. kennis der afd. Kroš (Bijdr.
- 5) Elio Modigliani. Un viaggia a Nias. Illustrado da 195 incisioni, 26 tavole tirate a parte e 4 carte geografiche, Milano 1890; idem, Les boucliers des Nias. Intern. Arch. f. Ethnogr. II, 5, 214.
 - 6) Over Engano zie Tijdschr. Aardr. Gen. VI, M. A. p. 109.

Tot de kennis der bevolking leverden de Heeren van den Toom 1), val Kerkhoff 2) en Dulaurier 3) belangrijke bijdragen, terwijl eindelijk ook Di Dubois het resultaat van zijn onderzoek over de diluviale fauna van he eiland het licht deed zien 4).

III. JAVA.

Ook bij het eiland Java treden de opnamen en de publicatie van verbet terde en nieuwe kaarten op den voorgrond. Voor de eerste wijzen wij of de trigonometrische opname der Noordkust ⁵); voor de laatste op de kaat ten van Samarang en Besoeki ⁶) en voorts op de nieuwe kaarten van geheel Java, door Dr. Dornseiffen ⁷) en door de H.H. Bos, Rijkens en val Gelder samengesteld ⁸). Andere bijdragen van meer zuiver geographische aard zijn een beschrijving van West-Java ⁹); de aanvullingen, ook nu noweder op Veth's Java geleverd ¹⁰); de gids door Straat Soenda ¹¹); de jon

J. L. van den Toorn, Het animisme bij den Menangkabauer der Pad. Boven landen (Bijdr. Instit. 1890, 1).

Ch. E. P. van Kerckhoff, Aanteekeningen betreffende eenige der in de afdeeling Padang-Lawas voorkomende Hindoe-oudheden, Tijdschr. I. T. L. en V. XXXII, 5, (1889)

⁸⁾ E. Dulaurier, Documents relatifs à l'histoire du royaume d'Atjeh pendant l XVIII siècle. Mem. soc. océan. I, p. 76.

⁴⁾ Over de wenschelijkheid van een onderzoek naar de diluviale fauna van N. I in 't bijz. van Sumatra (Nat. Tijdschr. N. I. 1889).

⁵⁾ Java Blad II, gecomp. op het Hydr. Bureau te Batavia 1889 1:500,000. Correctieblad op Java-zee en sangrenzende wateren. Blad II, 's Hage, Hydr. Bureau 1839. Noordkust Java Bl. IV. Reede Pekalongan tot eiland Mandalika trigonom. opgenomen door de Luit. ter zee, 1e kl, H. T. Kouwenberg, C. H. Cornelissen, A. W. T. C. van Woerden 1886—88, Schaal 1:200,000. Bat. Hydr. Bur. 1888; Noordkust Bl. V. Eiland Mandalika tot hoek Patjiran opgenomen door A. H. Hoekwater 1886—87, 1:200,000. Hydr. Bureau 1889. Bl. VI. Hoek Batoe Sawang tot Hoek Keraksain, 1:200,000. Bat. H. B. 1889. Wij vermelden hier ook de door het Hydr. Office to Washington uitgegeven Map of Java Sea. Western part and the Southern part to Chima 1:625,000 en the Map of Sundastrait and Approaches 1:195,000, beide van 1889.

⁶⁾ Topogr. kaart der Residentie Besoeki opgenomen 1878—1883, 1:100,000 met carton signaalkaart van de R. Besoeki 1:400,000.

⁷⁾ Kaart van Java en Madoera 1:950,000 met karton Batavia en havenwerken 1:60,000, Amsterdam 1890.

⁸⁾ Java, Schaal 1:500,000, 4 fol. bladen, Groningen 1890.

W. Van Gelder's Beschrijving van het eiland Java en zijne bewoners 2e ged. West-Java 3c dr. Bat. 1889.

¹⁰⁾ J. Kreemer, Eenige addenda en corrigenda op Veth's Java I, II. Ind.-Gids 1889, p. 1640 en 1827. Zie ook Witkamp, Een woord bij de kaart van Samarang (Tijdschr A. G. VI M. A. p. 165).

¹¹⁾ Gids voor het bevaren van Str. Soenda. Hyd. Bureau te Bat. 1889.

ste publicaties over de uitbarsting van Krakatau ¹); het verslag eener reis naar de Karimon Djawa-eilanden ²); Guppy's beschrijving der Zuidkust ³) en de artikelen over het boschgebied van Java's bergen en zijn belang voor de irrigatie (Ind. Gids 1889) alsmede over Pasaroeans bergen ⁴) door den heer J. W. H. Cordes. Ook van het eiland Java verschenen eenige photographien ⁵).

Dat van de publicaties over cultuurgewassen en den daaraan verbonden handel en industrie de meeste betrekking hebben op Java, is reeds vroeger door ons in het licht gesteld en blijkt ook nu weder ⁶). Naast deze vallen nog slechts eenige artikelen te vermelden, die op de bevolking in haar geheel ⁷) of op onderdeelen ⁸) daarvan betrekking hebben en zich met de industrie, de kunst, den godsdienst of het volksleven in 't algemeen bezighouden. — Ook tot de kennis van het eiland Bali werd een belangrijke bijdrage geleverd ⁸).

¹⁾ The Eruption of Krakatao and subsequent Phenomena. Report of the Krakatao Committee of the Royal Society. Edited by G. J. Symons, London 1888. Dr. J. Usher, Personal Reminiscences of the great Eruption of Krakatao (Transact. of the R. G. S. of Austr. Vict. Branch I 1888); Treub, Het nieuwe plantenkleed van Krakatao (Nat. Tijdschr. N. I. 1889). Flammarion, L'éruption de Krakatao. Avec illustrations, Paris 1890; Judd, The earlier eruptions of Krakatao, Nature XL (1889), p. 865.

²⁾ S. H. Koorders, Verslag van een dienstreis naar de Karimon Djawa-eilanden (Nat. Tijdschr. N. I. XLVIII 1889).

⁵⁾ The South Coast of West Java (Scott. Geogr. Magaz. 1889, p. 625).

⁴⁾ In Pasaroeans bergen, Ind. Gids, Dec. 1889 en Jan. 1890.

⁵⁾ Twaalf photographien van Java, 's Hage 1889.

⁶⁾ Zie het gezegde over de cultures van Indië in het algemeen in het artikel over de publicaties en reizigers der Nederlanders in de 19e eeuw, Tijdschr. A. G. 1889, p. 541.

⁷⁾ R. van Eck, Tooneeltjes uit het Javaansche volksleven, Eigen Haard 1889, p. 416. — Id., Een kwijnende tak van nijverheid op Java, p. 576. — R. A. Eekhout, Java. Overbevolking en emigratie, Bat. 1889. — E. Raoul, Javanais et Javanaises au Kampong de l'Expos. Univ., Paris 1889. — H. Flaes, Van over zee. Schetsen uit het Javaansche volksleven, Amsterdam 1839. — E. Metzger, Herrscher und Beherrschte saf Java, Globus 1889, 1, 2 en 3, p. 6, 22 en 42. — J. de Meester, In den kampong te Parijs, Eigen Haard 1889, p. 296. — J. Groneman, De gamelan te Jogjåkartå. Uitgegeven met een voorrede over onze kennis der Javaansche muziek door Dr. J. P. N. Land. Uitgeg. door de K. A. v. W., Amst. 1890. (Zie ook Versl. K. A. v. Wet. Afd. Lett, 3e Serie, VI, p. 201.

⁸⁾ Louis van Ende, Die Badnwis auf Java, Mittheil. Anthr. Ges. zu Wien, XIX, 1 en 2, p. 7. — C. A. Kruseman, Eenige dagen onder de Badoewis, Ind. Gids 1889, p. 118. — Over de Badoewis (Mittheil. Anthr. Ges. in Wien, 1889). — R. D. M. Verbeek, De oudheden van Madjapahit in 1815 en 1887 (Tijdschr. Bat. Gen. 1889. Afl. 1).

⁹⁾ F. A. Liefrinck, Bijdrage tot de kennis van het eiland Bali (Tijdschr. Bat. Gen.

EILANDEN EN NIEUW-GUINEA.

R. Le overige groote Soenda-eilanden bepaalden zich de meeste bijdragen. Lehrlve eenige publicaties op cartographisch en geologisch gebied 1) Let geologisch onderzoek van de afdeeling Menado met het oog op genalvoerende aderen (Jaarb. Mijnwezen 1889) en dat der vulkanen 2) van West-Borneo) tot studien over de bevolking. Zoo werden door Grabowsky Ngadjoes 3), door Tromp de geestenhuisjes op West-Borneo 4) en de Dunksche feesten 6), door Raim de ornamenten der Dajaks 5) beschreven. Voor Celebes hebben wij behalve op verbeterde kaarten te wijzen op de rem van Hickson Sydney 7), de studien van Niemann over de Boegineezen en Macassaren 5), Meyer's Celebes-Typen 9), de studien over de Minahassa 10), de beschrijvingen van Loehoe 11) en de bij Celebes gelegen Talaut-eilanden.

XXXIII (1889), Afi. 8 en 4). De onbebouwde gronden in de landschappen Boeleleng en Djambrana, Bat. 1889.

¹⁾ Str. Mangkasar, bl. I, Gecomp. op het Hydr. Bureau te Batavia, Sch. 1: 1,000,000, Bat. 1888. Celebes N. W.-kust hoek Dondo tot Stroomenkaap, Z. M. SS Montrado 1863, Sch. 1: 300,000, Bat. Hydr. Bureau 1888. Map of Celebes Approach to Macassar, Sch. 1: 125,900, London 1889.

²⁾ N. W. Easton, De vulkanen Sitong en Pando ter Westerafdeeling van Bornee (Jaarb. van het Mijnw. 1889).

⁸⁾ Ueber Ausserungen geistichen Lebens bei den Olo Ngadju in S. O. Borneo (Bijdr. Inst. 1889, Afl. 2). Familie, Verwandtschaft und Freundschaft bei den O. N. (id. Afl. 3). J. Perham, Manangism auf Borneo. J. Straits, Br. R. As. Soc. 1887, 19, p. 87. Grabowsky, Der Tod, das Begräbnis, das Tiwah oder Todtenfest und Ideën über das Jenseits bei den Dajaken (Intern. Arch. f. Ethn. II, 5, p. 177).

S. W. Tromp, Mededeelingen omtrent geestenhuisjes op W. Borneo (Intern. Arch. f. Ethn. Π, p. 168).

⁵⁾ Alois Raim, Ornamente der Dajaks, Wien 1889.

⁶⁾ Een Dajaksch feest, beschreven door S. W. Tromp (Bijdr. Inst. 1890, le Afl.)

⁷⁾ A naturalist in N. Celebes. A narrative of travels in Minahassa, the Sangir-and Talaut islands. With Notices of the Fauna, Flora and Ethnology of Districts visited With maps and illustrations, London 1889.

⁸⁾ Linguistische en ethnol. Studien. Bijdr. Inst. XXVIII (1889), Afl. 1 en 2.

Album von Celebes-Typen. 87 Lichtdrucktafeln mit ca 250 Abbildungen, Dresdes u. 's Hage 1889.

¹⁰⁾ J. D. E. Schmeltz, Haarbüschel erschlagener Feinde als Zier des Priester-Schwertes aus der Minahassa (Int. Arch. f. Ethn. II, 5, p. 228).

¹¹⁾ Het landschap Loehoe, getrokken uit een rapport van den Gouverneur van Celebes (D. T. van Braam Morris), Tijdschr. Bat. Gen. XXXII (1889) 5.

Voor de Molukken en kleine Soenda-eilanden daarentegen zijn belangjke aanwinsten voor onze eigenlijke geographische kennis verkregen.
aartoe rekenen wij het verschijnen van blad IV der Molukken 1); de
michten over de expeditie naar Flores en de Key-eilanden, in het Tijdhrift van het Aardr. Genootschap opgenomen 2); de zoo verdienstelijke
ublicaties in het Tijdschrift van het Bat. genootschap, betrekking hebnde op de Kei-, Tenimber en Timor Laoet, Babar, Leti en de Aroe-eilanen 3); het bericht van prof. Martens over zijne reeds in 1865 afgelegde
is op Banda, Timor en Flores 4); de beschrijving der Obi-eilanden 5), en
evermeerdering onzer kennis van de kleine Soenda-eilanden in het algemeen
van Flores meer in 't bijzonder 6). Enkele artikelen over de cultures 7)

¹⁾ Plannen van ankerplaatsen in den Mol. Archipel, Bl. IV, Hydr. Bureau, Bevia 1889. Hierop komen de volgende reeden enz. voor, waarachter het jaar der opming gevoegd is: Groot Kei, R. Langueer (1856), R. Feer (1880), Noordkust, goa. opgenomen (1862), Ankerplaatsen bij Thar en Batoe Bagea (1880), Ankerplaats or eil. Oer (1887), Vaarwater naar Kg. Gelanit (1887), Koor Ankerplaats voor Kg. lacei (1887), Ankerpl. voor Mata Hollat (1887), Baai van Ellat (1887), Klein Keinkerpl. bij Nyoersiet en B. van Totoad (1887), Koor. Ankerpl. Sermaaf (1888), rong B. van Kailakat (1858), voor Kg. Ondoer (1853), Aroe eilanden (Achterwal) ukerpl. van Mariri en Lolla (1888), Watoelei-groep (1888), N. O. kust Kei Tenimt (1887), Kei Doelah Vaarw. van Doelah tot Toeal (1886), Kl. Kei Ankerpl. voor Roemat (1887), voor Kg. Taiandoe (1887), Taam Ankerpl. op de Westkust (1887), ve eil. (Zuidkust) Ankerpl. bij Kg. Krei (1888), Wammer, Vaarw. van Dobo (1880), Mai Koor (1888), Zuidelijk deel der Aroe eil. (1885), Kei Doelah. Vaarw. van laah tot Toeal (1886).

³⁾ Over Flores. Zie Tijdschr. Aardr. Gen. VI (1889), p. 88 en Mitt. 1889, p. 29; pr de Key-eil., id. p. 81 en Mitteil., p. 102. Zie over de laatste groep ook Proc. R. 8. 1888, p. 764, met kaart, en over de gezamenlijke expedities van het A. G. Dl. II (1890), Afl. 2.

^{#)} Di. XXXII (1889), Afi. 1, 2; Di. XXXIII, p. 102, 160, 187 en 200. Ook het stachr. der Ver. f. Erdk. zu Dresden 1888, p. 158, bevat een artikel over de Λroezien van Ribbe.

⁶⁾ Ed. v. Martens, Bands, Timor und Flores, Z. Ges. f. Erdk. XXIV, 2 en 8, p. 88.

⁵⁾ Door J. Stormer, Zie Tijdschr. Bat. Gen. 1889.

⁵⁾ A. Jacobeen's und H. Kühn's Reise in N. Indiën, Globus LV, 11, p. 161, 12, 182, 18, p. 200, 14, p. 218, 15, p. 225, 16, p. 244, 17, p. 261, 18, p. 279, 19, 299. — Bastian, Ergebnisse der Reise des Capitan Jacobsen im I. Archipel (Z. f. Inol. XX, 6, 488 ff. — A. G. Vorderman, Het journaal van Albert Colfs. Een bijge tot de kennis der Kleine Soenda-eilanden. Met een schetskaartje, Batavia 1888.

7) R. von Barfus. Die Kultur der Gewurznelken und Muskatnussbäume. — Id., Die

R. von Barfus, Die Kultur der Gewurznelken und Muskatnussbäume. — Id., Die affectultur auf Menado, Ausland 1888, No. 36, p. 710.

en de bevolking ') der genoemde groepen treden daarbij geheel op den achtergrond:

Wat Nieuw-Guinea betreft, behalve het Hydrographisch Bureau, dat voor een verbeterde kaart der Noordkust van dat eiland zorg droeg ³), heeft zich weder door tal van publicaties over dat eiland verdienstelijk gemaakt de Heer F. S. A. de Clercq, die niet enkel de aanleiding tot de jongste expeditie naar dat eiland in het licht stelde, maar ook, even als vroeger over de baai van Wandamen, het eiland Mor en de Koemamba-eilanden ³), thans weder over de Mac Cluer golf en andere deelen van Westelijk Nieuw-Guinea ⁴) meer licht verspreidde. Ook de Heer Grabowsky leverde tot vermeerdering der kennis van de bevolking van dat eiland zijne bijdrage ⁵).

¹⁾ F. S. A. de Clercq, Dodadi-matoe en Goma-matoe of sielenhuisjes in het district Tobélo op N. Halmaheira, Intern. Arch. f. Ethn. II, 5, p. 204.

²⁾ Noordkust Nieuw-Guinea. Van 188° O. L.—141° O. L. Schaal 1:1,000,000. Bat. Hydr. Bureau 1889.

³⁾ Ind. Gids 1888, p. 460 (de baai van Wandamen in het Z. W. der Geelvinkbasi), p. 526 (iets over het eiland Mor tegenover de kust van Waropen); p. 662 (iets over de beoosten kaap d'Urville gelegen Koemamba-eil.). Zie ook zijn artikel: Vreemde reizigers over Ned. Nieuw-Guinea (Ind. Gids 1883, p. 1384).

⁴⁾ Ind. Gids 1889, p. 1112, p. 1258 (van af Tafia tot Humboldt-baai); p. 1297 (bet gebied der Kalana Fat of Vier Radja's in Westel. N. G.); p. 1666 (langs de Zuidkust der Mac Cluer-golf).

⁵⁾ Erinnerungen aus Neu Guinea, Ausl. 1889, No. 7, p. 121.

BESCHRIJVING VAN HET STROOMGEBIED

VAN DE

RIVIEREN IN HET RIJK VAN INDRAGIRI

EN DE

NABURIGE KUSTLANDEN

DOOR

H. B. DE BOER,

1º Stuurman bij de Gouvernements Marine.

BESCHRIJVING DER KUST, HET BELOOP DER STROOMEN EN DE HEERSCHENDE WINDEN.

De kusten van het Rijk van Indragiri zijn overal laag en moerassig; met hoog water loopen de oevers, die begroeid zijn met bakau-boomen, onder, zoodat de kustlijn in de Amphitrite-baai en Kwala Ladjauw door den boschrand wordt aangegeven. Meer landwaarts in, treft men aan de oevers vele nipa-boomen aan.

De riviertjes Aijer Tanah en Danam, waarvan de mondingen, als men eenmaal in de Amphitrite-baai is, al spoedig gezien worden, zijn eigenlijk niets anders, dan eene aaneenschakeling van grootere en kleinere kreken, die een aantal kleine eilandjes vormen, welke, uit de baai gezien, zich voordoen als kleine boomgroepjes.

Met laag water vallen de mondingen van die riviertjes gedeeltelijk droog. In de Amphitrite-baai liggen twee eilandjes, n.l.: Po Boesoeng en Po Belarat of Laijang.

Po Boesoeng, gelegen ten Zuiden van de Kwala Igal en ten Oosten van den Zuidhoek van Po Tjawan, is een vrij lang, doch smal eiland.

Het is begroeid met bakau-boomen, en "uitgezonderd aan den Westhoek", omgeven door een uitgestrekte harde zand- en modderbank.

Met laagwater ziet men een groot aantal bakau-boompjes uit die bank te voorschijn komen, die zich langzamerhand door voortplanting met het eiland vereenigen, waardoor Po Boesoeng reeds aanmerkelijk aan de N.O.zijde is toegenomen en aan de Z.W.-zijde een klein eilandje is gevormed.

Po Laijang ligt kort onder de kust, benoorden de geul van de Mandarivier. Het is een laag, met gras en riet begroeid eiland, dat moeilijk uit de baai te verkennen is. Met laagwater wordt dat eiland één met den vasten wal.

DE STROOMEN.

Buiten Tg. Baroe of Dato en Tg. Bakong loopt de vloed om de Zuid en de eb recht om de Noord.

Meer Oostwaarts wordt de richting dier stroomen echter geheel door de bewesten van Singkep gelegen eilanden gewijzigd. Men zal in de Rawapassage en benoorden Po Pandjang en de Nodja-groep, den vloed om de West waarnemen.

In de Amphitrite-baai, tot op ongeveer eene geogr. mijl afstand van de kust, volgt de vloed binnen Tg. Baroe al spoedig de strekking der kust om de West, tot de geul van de Manda-rivier, om vervolgens om de Zuid tot Z. W., tusschen Po Tjawan en Po Boesoeng, de Batang-Toeaka in te stroomen. Beöosten het eiland Boesoeng loopt de vloed om de Z. W. de Moeara-Pisang in. Naarmate in de baai Ts Baroe of Datoe noordelijker gepeild wordt, zal men den vloed in eene zuidelijker richting waarnemen.

De eb trekt van af Po Boesoeng dwars langs de mondingen van Igal-Plandok en Manda om de Noord, om vervolgens de strekking der kust om de Oost te volgen. Midden in de baai loopt de eb om de N.O.

Binnen Ts Bakong loopt de vloed om de Z.W., buigt zich op de hoogte van de Coehoorn-bank om de West, om vervolgens de richting der geul van de Kwalla-Ladjauw aan te nemen. Zuidelijker trekt de vloed vrijwel dwars langs de Sapat-Loewar en de mondingen der Reteh-rivier.

De eb loopt van af de mondingen der Reteh-rivier eerst om de O.N.O., en vervolgens om de N.N.O. tot de Coehoorn-bank, ontvangt op die hoogte den O.Z.O. tot Oost loopenden eb-stroom van de Indragiri-rivier, en vervolgt verder zijn weg om de N.O. naar Ts Bakong.

Het verval van water in de Amphitrite-baai en Kwalla Ladjauw bedraagt met springtij 13 à 14 Rijnl. voeten.

Met volle en nieuwe maan is het in de Amphitrite-baai ongeveer ten 3° hoogwater.

HEERSCHENDE WINDEN.

Op de kust van Indragiri en in den geheelen Riouw- en Lingga-Archiheerscht van af de maand April tot September de Z. O. moeson,
gedurende de overige maanden van het jaar de N. W. moeson. Deze
tesons waaien hier zeer ongeregeld. Men zal meestal in de maand Mei
ten Zuid-Oostelijke, en alleen in November stijf doorstaande Noordstelijke winden waarnemen. De winden, die men in de verschillende
tanden het meest te wachten heeft, zijn als volgt: in December, Januari
Februari waait het meestal stijf uit het Noorden, soms met hevige
len uit het N. W. tot Westen. In Maart is de N. O. wind de heerschende.
April en Mei waaien er zeer onregelmatige winden, met buien uit het
orden; in Mei dikwijls stijve Z. O. wind.

In Juni, Juli en Augustus zijn de Z.Z.W., Zuiden en Z.Z.O. winden heerschende, met buien uit 't Z.W.

In September, October en November krijgen de Z.W. Westen en N.W. den de overhand; vooral in October heeft men dan buien uit het O. en Westen te wachten.

BESCHRIJVING DER BANKEN.

In de Amphitrite-baai liggen de navolgende banken. Tusschen Ts Baroe Dato en de monding der Manda-rivier, steekt eene zachte, gelijkma-oploopende modderbank uit. De strekking van den Oostkant dier bank Z.Z.W. van Ts Baroe of Dato tot op eene geogr. mijl afstand van kust, en loopt vervolgens recht om de West tot de geul van de Manhivier.

De modderbank, die gelegen is tusschen de geulen van de Manda- en de l-nivier, is eveneens zacht, en loopt gelijkmatig op. Zij strekt zich nog n 1/1 geogr. mijl uit den wal; beide banken vallen met laag water t droog; alleen wordt dan Po Belarat of Laijang één met de kust, en begin der banken aan den oever zichtbaar.

De bank, bezuiden de geul van de gemeenschappelijke monding van Igal- en Plandok-rivieren is minder zacht, en strekt zich ¹/₂ geogr. mijl de N.O. t. O. van het eiland Tjawan uit. Met laagwater valt die bank botendeels droog, alsdan ziet men enkele boompjes uit de bank komen; den op de bank staan reeds vrij hooge bakau-boomen.

De bank van Po Boesoeng strekt zich om de Z.W. ongeveer eene

geogr. mijl, om de N.O.t.O. 3/4 mijl, en om de Oost ongeveer eens halve mijl van het eiland uit. In de nabijheid van het eiland is die bank vrij zacht, doch op grooteren afstand bestaat zij uit hard zand, en loopt aldaar vrij steil aan.

De N.O. kant van de bank slibt aan, en bestaat uit zand met fijne schelpjes. Aan den Z.W. kant van het eiland Boesoeng is een klein eilandje ontstaan, dat met laagwater één wordt met P° Boesoeng.

De overige banken, als die van Ts Rangga, van de Kwalla Gaoeng, en aan den Noordkant van Po Pisang, strekken niet ver uit den wal.

In de Kwalla Ladjauw strekt zich van af Ts Bakong om de Z.W. tot W.Z.W. een zachte, gelijkmatig oploopende modderbank uit, die kort onder den wal met laagwater droog valt. Ongeveer O.Z.O. van de visschers-kampong, (gelegen op den Zuidhoek van Po Baso of Bakong aan de monding der Indragiri-rivier), is die bank vrij hard en valt aldaar met laagwater grootendeels droog.

De Coehoorn-bank ligt midden in de geul van de Indragiri-rivier; zij bestaat uit modder en zand, en is op enkele plekken, waar met laag water niet meer dan 7 à 8 Rijnl. voet water staat, vrij hard.

Zij strekt zich uit Oost en West, over eene lengte van ongeveer $\frac{1}{4}$ geogr. mijl; haar grootste breedte bedraagt \pm 300 meter. De westpunt van die bank loopt vrij steil aan.

Het schulpenbankje, gelegen ten Noorden van Ts Kloeang en ten Z.O. van de bovengenoemde visschers-kampong op Po Bakong, is zeer steil en hard

Bezuiden dit bankje wordt op eene kabellengte, met laagwater nog s våam gelood, terwijl de bank zelve dan reeds 2 voet boven water steekt Haar ligging wordt met hoogwater, duidelijk door sterke stroomravelingen aangegeven

De Noordkant van de modderbank beoosten Po Nioer of Kloeang strekt zich van af Ts Kloeang tot op 11/2 geogr. mijl afstand, ongeveer recht om de Oost, van de kust uit; strekt van daar om de Z. Z. W. to dwars van Ts Laut, en vervolgens om de Z. W. tot op eene geogr. mij afstand van de mondingen der Reteh-rivier; zij loopt gelijkmatig op et alleen voor de Sapat-Loewar worden op die bank enkele harde plaatset gevonden.

Tot op ongeveer eene geogr. mijl afstand O.Z. O. van den Noord-et Zuid-oever van de Sapat-Loewar steken nog twee vrij harde banken uiden wal, die de eenige geul vormen naar de Sapat-Dalam. Bij spring laagwater vallen die banken geheel droog, en in de geul wordt alsdar niet meer dan 4 Rijnl. voet water aangetroffen.

Geassisteerd door een visscher uit de Sapat-Dalam, dien wij als loods aan boord hadden, werd in 1888 en 1889 (bij gelegenheid dat wij voor de Sapat-Loewar aan den grond zaten) door mij vruchteloos met de sloep gezocht naar de geul, die de zeekaart aangeeft.

De modderbanken benoorden en bezuiden de geul van de Kwalla-Bataparang zijn zacht, en vallen met laagwater grootendeels droog.

BESCHRIJVING DER RIVIEREN.

De Manda-rivier. Om, van uit zee komende, deze rivier te verkennen, stuurt men, nadat Ts. Baroe of Dato op eene geog, mijl afstand Noord in peiling is gebracht, met West tot W. 1/2 Z. op het lood de Amphitritebaai in, daarbij zorg dragende, de modderbank niet minder dan in 4 vaam te naderen. Zoodra het eiland Boesoeng en de Igal rivier in 't zicht komen, wordt de monding van de Igal West in peiling gebracht, en op die monding aangehouden. Eerst als de N.O. hoek van Po. Boesoeng Z.W. gepeild wordt, zal men de monding van de Manda rivier goed open zien, en bij middelbaren waterstand 31/2 à 4 vaam looden. De geul van de Manda-rivier loopt Z.O. t.O. Om dus in de rivier te komen, moet men haar monding N.W. t.W. in peiling brengen, waarop men in die richting naar binnen kan houden. De sero's die aan beide kanten van die geul staan, krijgt men spoedig in 't zicht, en door deze sero's siechts te volgen, zal men met hoogwater niet minder dan 3 vaam in de genl looden; met laagwater wordt 8 à 10 Rijnl, voet gelood. De stroom trekt dwars door de verst in zee staande sero's heen; verder naar binnen volgt de stroom de richting der geul.

In de monding, en verder de rivier opvarende, wordt spoedig 6 tot 10 vaam gelood, doch voor de kampong Keria, gelegen 13/4 geogr. mijl N. W. t. N. van de monding, wordt in 15 vaam steenachtigen grond geankerd.

Het rivierwater is hier zout, en volgens ingewonnen berichten is de nivier slechts tot twee hoeken boven de Ks. Keria bevaarbaar, en loopt een weinig verder te niet.

De vele zijtakken der Manda vormen een aantal kleine eilandjes; met lagwater vallen bijna alle zijtakjes droog, alleen de troessan Oental, die in de Igal-rivier uitkomt, is dan nog met een sampan bevaarbaar.

De Igal- en de Plandok-rivier hebben gezamenlijk eene monding die, als men eenmaal in de baai is, al spoedig gezien wordt; de richting der geul is O. N. O.

Om deze rivieren binnen te komen moet men de monding eerst in peiling brengen W. Z. W.; men blijft echter, met West als koers, zoolang op de monding aansturen totdat de N. O. hoek van Po. Boesoeng Z. Z. W. gepeild wordt; eerst dan wordt de monding in bovengenoemde peiling gebracht en naar binnen gestoomd. Met hoogwater wordt niet minder dan 3 vaam, en met laagwater niet minder dan 9 Rijnl. voet water in de geul gelood; in de monding neemt de diepte snel tot 5 vaam toe.

De diepte in de Igal-rivier neemt van af de monding steeds toe, zoodat voor de kampong Polais, ongeveer 21/2 geogr. mijl van zee gelegen, in 15 vaam water geankerd wordt (steenachtige grond).

De vele zijtakjes, die ook deze kustrivier heeft, zijn evenals die van de Manda-rivier, niets anders als kreken; zij vormen kleine eilandjes en loopen met laagwater bijna alle droog. Alleen door de Ss. Pandan heeft de Igal gemeenschap met de Plandok-rivier.

In de Plandok-rivier wisselen de diepten af van 8 tot 10 vaam, en voor de kampong Simpang ongeveer, gelegen 8 geogr. mijl van de monding wordt in 12 vaam "harde grond" geankerd.

Plandok- en Igal-rivier loopen ongeveer evenwijdig, doch hebben, niettegenstaande hun groot aantal zijtakjes, alleen, zooals bereids gezegd is, door de troessan Pandan met elkaar gemeenschap.

In beide rivieren is het water zout en kan niet veel verder dan tot de kampongs Polais en Simpang opgestoomd worden; zij loopen, evenals de Manda rivier, spoedig te niet.

De breedte van de Manda-, Igal- en Plandok-rivieren wisselt af van 200 tot 250 meter, en door slechts midden in het vaarwater te houden, loopt men vrij van de bankjes, die onder de oevers liggen.

De Sg. Bantaijan is een van de grootste zijtakken der Plandok-rivier; zij loopt om de Z. O. tot de Ts. Bantaijan en stort zich vervolgens om de N. O. in de gemeenschappelijke monding van de Igal- en Plandok-rivieren. Op de hoogte van Ss. Bantaijan zendt zij een zijtak om de Zuid, die zich ontlast in de Batang-Toemoeh en den naam verkrijgt van Ss. Rawang, die, bij eene diepte van 5 tot 7 vaam, eene breedte heeft van 40 à 50 meter. Voor stoomscheepjes, zooals de "Djambi" en "Indragiri" van de Gouvernements Marine, is dit riviertje zeer goed bevaarbaar.

Door de monding van Igal en Plandok en de Ss. Rawang wordt Po. Tjawan gevormd.

De kustlijn van af de Kw. Manda tot de Ss. Rawang, zoomede de strekking der bankjes en de ligging van Po. Boesoeng, zooals die op de zeekaart voorkomen, laten, wat nauwkeurigheid betreft, wel iets te wen-

schen over, doordat blijkbaar de kust en de banken, sinds de laatste trigonometrische opneming, door den sterken stroom, zeer in strekking en ligging veranderd zijn.

Het vaarwater tusschen Po. Tjawan en Po. Boesoeng is vrij breed en door daar slechts in het midden te stoomen, zal men, met middelbaren waterstand, 3 vaam diepte behouden.

Om van uit zee komende, zeker te zijn vrij te loopen van de harde punt der bank van P°. Boesoeng, moet men met West zoolang op de Kw. Igal aanhouden, totdat de hoek van den linker oever der Gaoengrivier goed midden in de opening van P°. Boesoeng en den Zuidhoek van P°. Tjawan gepeild wordt; daarna kan men midden op bovenbedoeld vaarwater koers zetten.

De Gaseng-rivier. Om van af P°. Boesoeng naar de monding van deze rivier, de grootste diepte te behouden, moet, zoodra midden P°. Boesoeng Oost gepeild is, Ts. Rangga even op stuurboords boeg gehouden worden; men kan dan, met dien koers, den wal tot op ± 500 meter naderen, en verder de strekking der kust volgen, totdat met W. t. N. naar de monding kan gestoomd worden. De richting der geul is O. t Z.; de bankjes benoorden en bezuiden daarvan, steken niet ver uit den wal, zij zijn minder zacht en loopen vrij steil aan. In de geul staat met laag water nog 2 vaam. Van af de monding wordt in de rivier B. B. wal gehouden, tot voorbij de Kw. Anak Sirka, en vervolgens van de eene bocht in de andere gestoomd; de diepten zullen dan 4 tot 5 vaam bedragen.

De breedte van de Gaoeng-rivier bedraagt bij de monding ± 300 à 350 meter, doch neemt stroomopwaarts gaandeweg af. Voor de K^g. Simpang, op ongeveer 6 geogr. mijl afstand van de monding gelegen, is de rivier niet breeder dan 100 meter.

Er wordt voor die kampong geankerd in 5 vaam "moddergrond". Met het oog op de geringe breedte der rivier en den slechten ankergrond voor de kampong, verdient het aanbeveling een tros tot steun van het anker op den wal uit te brengen.

Blijft men hier een nacht ten anker liggen, dan moet, door achter en voor aan beide zijden trossen op den wal uit te brengen, het schip belet worden, door de hier zoo sterk loopende getijstroomen te zwaaien.

Indien men deze voorzorgsmaatregelen niet neemt, wordt men zeker, zoodra de vloed of ebbe goed door is, in het bosch gezet, waardoor men allicht, door de onder den oever liggende zware boomstammen, averij aan het roer krijgt.

Het rivierwater wordt met ebbe reeds voor de K. Poenjoenga zoet, doch is als drinkwater niet geschikt, omdat het met veel modder en vul bezwangerd is.

De Batang Toeaka. Deze rivier vindt haar oorsprong in het meer, d liever gezegd het moeras, dat gelegen is ten Noorden van Sg. Mompah en ongeveer 1½ geogr. mijl westwaarts van de Sg. Pelang. Alleen in de onmiddellijke nabijheid van het moeras wordt roodachtig zoetwater aangetroffen. Door de troessan Mas heeft de Indragiri-rivier met de Batang Toeaka gemeenschap. Door Sg. Stimpo (een zijtakje aan den rechter oever van de Batang Toeaka) met een sampan ongeveer 2 uur op te varen, kan men, door verder een voetpad te volgen van ongeveer 4 uur gaans, op de hoogte van Kg. Pedjamatran in de Indragiri-rivier komen. Van af de Kw. Gaoeng wordt in de Batang-Toeaka midden vaarwater gehouden, de diepten zullen dan van 3 tot 6 vaam afwisselen.

De troessan Mas waardoor men, zooals hierboven gezegd is, van de Batang Toeaka in de Indragiri kan komen, heeft eene breedte van 130 tot 150 meter, met eene diepte van niet minder dan 4 vaam.

Van uit de Batang Toeaka in die troessan te komen levert hoegenaamd geen bezwaar op.

Door slechts eene smalle geul, waarin met laagwater niet meer dan 7 à 8 Rijnl. voet diepte gevonden wordt, komt men van de Troessan Mas in de Indragiri-rivier. Die geul wordt gevormd door eene modderbank: "Pannekoek" geheeten, die zich uitstrekt van af de Kg. Boegis of Sapat, tot dwars van de Troessan-Mas en een zandbankje van den overwal. Om nu zeker te zijn dat men in de geul zal komen, wordt eerst in de Troessan-Mas midden vaarwater gehouden; zoodra nu de Indragiri-rivier aan bakboord goed open gezien wordt, kan men stuurboordsoever gaan houden, en dien zoolang volgen totdat met Z. t. W. tot Z. Z. W. als koers de Indragiri-rivier wordt overgestoken.

De Indragiri-rivier.

Door de Batang-Toeaka, de Sapat-dalam, de Moeara-Pisang, de Selat-Tjoentjoeng en de Kw. Ladjauw ontlast de Indragiri-rivier zid in zee.

De Batang-Toeaka, zie de beschrijving.

De Sapat-Dalam. Ofschoon dit riviertje een breedte heeft van 250 300 Meter, met eene diepte van 5 tot 8 vadems, is het niet als roul aan te bevelen. Om er van de Indragiri-rivier in te kunnen komen, mod

men over eene droogte heen waarop, met laag tij, niet meer dan 5 Rijnl. voet water staat, en om van de Sapat-Loewar zee te willen kiezen moet zelfs voor scheepjes met een diepgang van 6 voet, hoogwater worden afgewacht, want in de geul die om de O.Z.O. loopt, staat met laag tij, niet meer dan 4 Rijnl. voet water. Soms kan men hier een visscher krijgen, om het schip te loodsen.

De Selat Tjeentjoeng is slechts als een troessan te beschouwen, en is alleen voor sampans bevaarbaar.

De Kw. Ladjauw is de grootste monding van de Indragiri-rivier en zal later uitvoerig behandeld worden.

De Meeara-Pisang. Om van uit de Indragiri-rivier door de Moeara-Pisang zee te willen kiezen, moet men bij 't binnenkomen daarvan, zorg dragen vrij dicht onder den Z. W-hoek van P° Tjoentjoeng te zijn, want anders loopt men gevaar van op de bank van den Z. O.-hoek van P° Mas te stoomen. Deze bank is vrij hard, loopt steil aan, en strekt zich ruim tot over ²/₃ gedeelte van het vaarwater uit. Met laag water wordt in de Moeara-Pisang niet minder dan 2 vaam gelood. Eene voor de scheepvaart geschikte geul van de monding naar zee, is door ons nog niet gevonden.

Met spring-laagwater werd een groote zandbank aan de Noord-kust van Po. Tjoentjoeng gezien, die ongeveer tot op 1/4 geogr. mijl afstand van de kust droog lag. Ook werd bevonden, dat door eene koerslijn te volgen, waarin men, volgens de zeekaart, van af de monding 2 à 21/2 vaam zou moeten looden, men alle kans heeft van op de bank van Po. Boesoeng te loopen, die zich veel verder om de Zuid schijnt uit te strekken dan genoemde kaart aangeeft. Niettegenstaande de Chineezen met hunne tongkangs dikwijls in de Amphitrite-baai aan den grond geraken, nemen zij toch de Moeara-Pisang om in en uit de Indragiri-rivier te komen. De reden daarvan is, dat de Amphitrite-baai voor hen op eene reis van Singapore korter bij is, dan de Kw. Ladjauw, en zij in de baai veilig met ongunstigen wind in slecht en ondiep water kunnen ankeren (daar de baai toch alleen met N.O., Oost en Z.O. winden open ligt). Ook moeten de meeste tongkangs in de Moeara-Pisang Prigi Radja, eene Chineesche vestiging aandoen, hetzij om drinkwater aan te vullen, of wel om lading van Singapore te lossen, of om boschproducten in te nemen. Voor stoomschepen zijn echter de Batang Toeaka en de Kw. Ladiauw de aangewezen vaarwaters.

OVER HET BINNENLOOPEN IN DE KWALA LADJAUW EN HET VERDER OPSTOOMEN VAN DE INDRAGIRI-RIVIER.

Aangezien buiten Tg. Bakau of Bakong de vloed recht om de Zuid, en de eb recht om de Noord trekt, met eene kracht van soms 2 à 2¹/₁ geogr. mijl in de wacht, zou het wel eens kunnen gebeuren, dat men, bijvoorbeeld van om de Oost komende, door den stroom, zoover uit den koers gezet werd, dat men bij het verkennen van land, zich vergiste met Tg. Baroe en Tg. Bakong.

Als men in de gelegenheid is om goede peilingen te kunnen nemen, zal n. t. eene dergelijke vergissing niet plaats kunnen hebben. Echter verdienen peilingen op de eilanden gelegen ten Noordwesten van het eiland Singkep weinig vertrouwen, aangezien de ligging van die eilanden op de zeekaart wel iets te wenschen overlaat; zoo is bijv. de ligging van de eilanden Rawa, Silengseng en Boenta, minstens ½ geogr. mijl of 2 minuten noordelijker dan die kaart aangeeft.

Om alle vergissingen omtrent de hoeken Baroe en Bakong te voorkomen, diene het volgende.

Als Tg. Bakong in 't zicht komt zal die hoek zich eerst voordoen, nl. (in de peiling West tot W. Z. W.) als een groepje vrij hooge boomen, en later als een hompeltje.

Krijgt men echter Tg. Baroe in diezelfde peiling en afstand in 't zicht, dan ziet men eerst een paar verspreide boomen, die om de Noord steeds in aantal tot een lange rij toenemen, 't geen niet het geval is bij Tg. Bakong.

Als Tg. Bakong in de peiling W. N. W. in 't zicht komt, zal zij eerst gezien worden als enkele dicht bij elkaar staande hooge boomen, die echter spoedig een dichte groep worden, en daarna duidelijk den hoek vormen. Tg. Baroe daarentegen zal in diezelfde peiling en afstand niet als een hoek gezien worden, maar als eene lange rij verspreide boomen, die in aantal om de Noord en Zuid steeds toenemen.

Om in de Kw. Ladjauw zoo min mogelijk door den stroom uit den koers gezet te worden, moet bij het binnenloopen daarvan, eerst Tg. Bakong op eene halve geogr. mijl afstand Noord in peiling gebracht worden. Nu wordt het lood gaande gehouden, en al naarmate de eb of vloed loopt, Z. W. t. W 1/2 W. tot Z. W. t. W. gestuurd.

Men heeft door Tg. Bakong in de gegeven peiling zoo kort te naderen en de genoemde koersen te sturen, het voordeel den stroom van achteren, of ongeveer recht op den boeg te hebben; ten tweede weet men, zoodra er minder water gelood wordt, bijv. 4 vaam, dat men tegen de Noord- en niet tegen de Zuidbank aanzit.

Meestal zal men door de opgegeven koersen te volgen bevinden dat de diepten vrij snel van 12 tot 7 vadem afnemen, doch deze laatste looding zal men dan ook een geruimen tijd behouden, om later, in de nabijheid van de Coehoornbank tot 4 en 3½ vaam te minderen. Zoo dit nog niet het geval mocht zijn, moet men op deze hoogte, eerst de monding der Indragiri-rivier in peiling brengen W. N. W. (vooral niet westelijker), en dan met West als koers, Tg. Kloeang even op bakboordsboeg houdende, den wal insturen, tot dat men de kust op ruim ½ geogr. mijl genaderd is; men loopt dan bezuiden de Coehoorn-bank langs.

Mocht het geval zich voordoen, door met West te sturen, dat er plotseling minder water en harde grond gelood wordt dan kan men er zeker van zijn tegen de Coehoorn-bank aan te zitten; want is men in de geul, dan mag zelfs met laagwater dwars van die bank niet minder dan 31/2 vaam gelood worden. Eenmaal voorbij die bank zijnde, neemt de diepte spoedig tot 6 en 8 vaam toe. Indien men nu door met West tot W. 1/2 N. te sturen, den wal zoover genaderd is dat Tg. Laut en Tg. Kloeang in één gepeild worden, kan men gaandeweg met W. N. W. tot N. W. t. W. op de monding aanhouden, doch in geen geval mag de eerste steile binnenhoek van S. B. wal of van den linker oever der rivier, vrij komen of gezien worden, voor dat Tg. Kloeang door het Zuiden is. Hoewel de bestaande schetskaarten voldoende aangeven, welken oever men moet houden om de rivier verder op te stoomen, ten einde van de verschilkade droogten vrij te loopen, is het niet overbodig op enkele banken te wijzen, die, of doordat zij midden in het vaarwater liggen, of omdat zij zeer steil aanloopen, vooral gemeden moeten worden.

In de veronderstelling dat de rivier stroomopwaarts gestoomd wordt, treft men eerst het bankje bewesten de Moeara-Pisang aan; het ligt midden in de rivier, is hard en valt zelden droog.

Van beide oevers van de Sapat dalam steken twee vrij harde zandbanken uit, die met laagwater gedeeltelijk droog vallen; eene derde droogte ligt juist midden voor de monding van de Sapat-dalam; het is een kleine zandplaat waarop met laagwater niet meer dan 5 Rijnl. voet water staat.

Tusschen de monding van de Sapat-dalam en het begin van de Kg. Boegies op P^o. Mas, ligt midden in de rivier een uitgestrekte zandbank, waarop met laaggetij 4 à 5 voet gevonden wordt.

Van af de Kg. Boegies strekt zich eene groote modderbank om de

Z. W., tot dwars van de Troessan-Mas en tot over de helft der breedte van de Indragiri rivier uit; ze wordt de "Pannekoek" genoemd.

De van Staveren-bank, gelegen midden in de rivier voor Geuzenoord, bestaat uit hard zand, en valt met gewoon laagwater reeds gedeeltelijk droog; aan beide kanten van die bank is een geul met eene diepte van 4 tot 5 vaam. De breedste geul is die bezuiden de bank.

Door de bank van P°. Pallas te willen mijden, moet men zorg dragen niet op het bankje te loopen, dat ongeveer Z. W. van Pallas op 100 meter afstand van bakboordswal ligt, en waarop met laagwater niet meer dan 5 Rijnl. voet gelood wordt.

Van af Po. Pallas tot Sg. Pangalian zal men door van de eene bocht in de andere te sturen, vrij van de banken loopen.

Van af Sg. Pangalian moet stuurboordswal zoolang gehouden worden, totdat de hoek aan bakboord scherp gevormd is; dan steekt men vervolgens langzamerhand over, den eerstvolgenden stuurboords-hoek even op stuurboords-boeg houdende. Daar op deze hoogte, van beide oevens eene bank uitsteekt, is de rivier voor de kampong Pekan-Toeah ondiep; men zal gedurende het oversteken op een paar plaatsen met laagtij, niet meer dan 9 Rijnl. voet water aantreffen.

De harde bank, gelegen tegenover de kampong Baijas, strekt zich tot over het 2/3 gedeelte der breedte van de rivier uit; door even voordat men Sg. Baijas ziet, onmiddellijk naar bakboords-wal over te steken, loopt men van die bank vrij, en eerst als de Kg. Baijas aan stuurboord achterlijker dan dwars gepeild wordt, mag weer overgestoken worden naar stuurboordswal; men zal dan met laagwater nog 2 vaam behouden.

Om de zeer steile bank van den hoek, gelegen tegenover de Kw. Tjenako, te mijden, moet men op die hoogte zoolang kort onder baksboords-wal houden, als mogelijk is om het vaartuig, als het roer bakboord te boord gelegd wordt, nog vrij te doen zwaaien van den Noordhoek van de Kw. Tjenako. Schepen langer dan 40 meter zullen, om rond die bank te kunnen komen, eerst moeten ankeren.

Gedurende de maanden, dat het in de bovenrivier laagwater is, wordt de rivier van af de Kw. Tjenako moeielijk te bevaren; zelfs schepen met een diepgang van slechts 6 voet moeten den vloed afwachten om over de drie droogten te komen, die gelegen zijn, een hoek stroomopwaarts van de Kw. Tjenako, bij P°. Djoemahat en P°. Loemoe, en dan nog is het geraden niet verder dan tot Sg. Raija op te stoomen; men kan dan eerst de aanwijzing van de peilschaal te Ringat opnemen en informeeren of het water vallend of wel rijzende is.

Oschoon v/m April t/m October de tijd is van lage waterstanden in de rivier, gebeurt het toch wel dat men zelss in de maand Juni nog met een stoomschip tot Ringat kan komen, zooals uit den hier bijgevoegden staat van peilschaal-aanwijzingen blijkt.

De ondiepste plaatsen van af Sg. Raija tot Ringat worden aangetroffen voor de Kg. Gadja, en voor de Sg. Lobo-Tanggoh. Op die plaatsen wordt avoet water minder gelood, en midden in de rivier, voor de Controleurswoning, wordt 3 voet meer water gelood dan de peilschaal aangeeft.

Met buitengewoon laag water in de bovenrivieren kan het gebeuren dat men niet verder dan Kw. Tjenako kan komen; de vloed loopt dan tot voorbij P°. Gelang en is tot Sg. P°. Gadjah, door rijzing van het opgestuwde water, nog merkbaar.

Daar de zandbanken, gelegen stroomopwaarts van Kw. Tjenako, gedurig aan verandering onderhevig zijn, is het onbekenden aan te raden, van af deze rivier, zich van een loods te bedienen. Enkele roeiers van de zeilboot van den Controleur te Ringat hebben meermalen daarvoor dienst gedaan.

Indien men de rivier verder dan Ringat wil opstoomen, moet men een loods meenemen, de peilschaal moet alsdan niet minder dan 11 voet aanwijzen, en dan nog wordt de reis niet aanvaard als het water vallend is.

De ondiepste plaatsen boven Ringat treft men aan bij Danau Baroe en voor de Kampongs Djapoera en Petalongan of Krap; de diepten die daar gevonden worden, komen overeen met die, welke met eene zelfde peilschaal-aanwijzing bij de Sgs. Lobo-Tanggoh gelood worden.

De moeielijkst rond te stoomen hoeken zijn Tg. Oelak en de hoek van Petalongan, alwaar in de bochten sterke maalstroomen loopen.

Van af de Kg. Merong veroorzaken de vele zware boomstammen, die midden in het vaarwater en in de bochten staan, veel last om de rivier verder op te stoomen. Om afstoomende van al die hindernissen vrij te loopen, wordt de noodige attentie op roer en machine vereischt.

Voor de Kg. Sawal liggen twee steenen ongeveer midden in de rivier; zij komen echter nooit boven water, de passage is tusschen beide steenen.

Van af Kg. Sawal wordt de bedding der rivier steenachtig en bestaan de banken grootendeels uit grint. Volgens ingewonnen berichten bij de kampongbewoners moet, wanneer men eenmaal P°. Pattangan gepasseerd is, de rivier weder goed bevaarbaar worden tot Kg. Pranap.

Met eene peilschaal-aanwijzing van 11 voet te Ringat is, op eene reis in de boven-rivier, de Gouvernements-Stoomer "Indragiri", den 23en November 1888, niet verder kunnen komen dan tot de eilanden Petanggan. In

het vaarwater bewesten die eilanden stond toen niet meer dan 5¹/₄ voet water. De vaarwaters tusschen en rond die eilanden werden nauwkeurig door mij opgelood en in kaart gebracht, waaruit bleek, dat het vaarwater bewesten van die eilanden, bij een hoogeren waterstand, het eenige bevaarbare is. De geul, waarvan de bedding uit grove grint bestaat, is vrij breed en heeft eene gelijkmatige diepte.

Het midden-vaarwater is niet alleen smal, maar ook gevaarlijk door het aantal grootere en kleinere steenen; de diepten nemen in dit vaarwater op enkele plaatsen plotseling van 14 tot 4 voet af.

Het oostelijk vaarwater, dat aan de Noordzijde een vrij breeden ingang heeft, met eene diepte van 3 vaam, wordt aan het Zuideinde zoo smal, dat er slechts eene geul overblijft, ter breedte van 25 meter bij eene diepte van 2 vaam, waarin een zeer sterke stroom loopt. De oevers zijn hier steil, en bestaan grootendeels uit rotsblokken. Van af Po. Petanggan wordt de rivier verder stroomopwaarts, door de Indragiriërs Batang-Kwantan genoemd. Daar wij tot nog toe met het schip niet verder zijn gekomen dan Po. Petanggan, is van af die eilanden op mijn schets- en overzichtskaart slechts het vermoedelijke beloop der rivier aangegeven. De rivieren Anak-Sirka, Tjenako en meer andere, die door éénen oever op de kaart zijn aangegeven, werden overgenomen van schetskaartjes, die door den Controleur Graafland, of wel door Inlandsche Hoofden vervaardigd waren en dus hoegenaamd geen vertrouwen verdienen, omdat de opnemers niet van instrumenten voorzien waren. De schetsen dus van de Anak Sirka, Tjenako, en van meer andere riviertjes, die op de schets- en overzichtskaart slechts door éénen oever zijn aangegeven, moeten daarom beschouwd worden als de meest vermoedelijke richtingen van die rivieren te zijn.

Op het schetskaartje van bovengenoemden Controleur komen vele verkeerswegen voor, waarvan echter geen enkele door mij is overgenomen. Alleen is mij bekend, dat men door een voetpad te volgen van de Kg. Pedjamahan (Indragiri rivier) in de Sg. Stempo, en verder in de Batang. Toeaka kan komen, dat er een weg bestaat van Djapoera naar de Kampar-rivier, dat men van uit Pekan-Heran door gedeeltelijk voetpaden te volgen, kleine moerassige streken door te waden, en riviertjes over te steken in de boven Tjenako-rivier kan komen, en ook dat die rivier door de Sg. Eko zoo ver mogelijk op te varen en vervolgens langs een weg bereikt kan worden.

De Retch-Rivier.

Deze rivier stort zich door drie mondingen in zee, de Kw. Bataparang, Kw. Tongah en Kw. Kerang of Terap geheeten. De geul van de Bataparang loopt om de W. Z. W. — O. N. O., met laagwater zal daarin niet minder dan 6 à 7 Rijnl. voet gelood worden; zachte modder onder de kust, en hardere grond meer naar buiten.

De Kw. Tengah is alleen voor prauwen bevaarbaar. De zuidelijkste monding of de Kw. Kerang of Terap moet, volgens sommige kustbewoners, het diepst zijn, anderen beweren dat de Noordelijkste monding die altijd door ons als vaarwater genomen wordt, het meeste water heeft. Van uit zee komende, heeft men aan de twee vrij groote visschershutten, die op den N.O. hoek van Po. Assam of Kisjang aan 't strand staan, eene zeer goede verkenning, en, daar aan beide zijden van de noordelijkste geul sero's worden aangetroffen, is de Kw. Bataparang zeker wel de gemakkelijkste monding om in te stoomen. Een weinig be-Noorden van die monding, stort zich nog eene kleine soengei van uit de hoofdrivier in zee.

In het vaarwater benoorden P°. Assam of Kitjang, wordt met laagvater niet minder dan 11 Rijnl. voet gelood, doch van af de Sg.
Sampeh, alwaar de drie mondingen zich vereenigen, wordt de rivier ondeper, en alleen met hoogwater bevaarbaar voor schepen tot en met 10
voet diepgang. Met laagwater worden, stroomopwaarts van Sg. Sampeh,
verscheidene plaatsen aangetroffen, waarop niet meer dan 4¹/₂ voet diepte
gevonden wordt. Daar het verval van water ongeveer 10 Rijnl. voet bedraagt en de bedding der rivier uit zachte modder bestaat, zal men door
aan den grond te loopen hoegenaamd geen averij aan het vaartuig bekomen.

Voor de Kg. Peteh, eigenlijk Kotta Baroe geheeten, die ongeveer 9 geogr. mijl van de monding ligt, wordt geankerd in 3³/₄ vaam (als het hoogwater is). Daar de ankergrond hier, evenals in de Gaoeng-rivier, zeer slecht is, moet men, om drijven van het vaartuig te beletten, trospen op den wal, tot steun van het anker uitbrengen.

Bij de Kotta-Baroe vloeien de Gangsal en de Reteh-rivier inéén, en stroomen verder onder den naam van Sg. Batang naar zee.

Volgens berichten van de kampongbewoners moeten beide rivieren pog voorbij Kotta-Baroe een paar uur kunnen worden opgestoomd, en kan men, door de Gangsal zoo ver mogelijk met een sampan op te varen, en vervolgens een voetpad te volgen in de boven Tjenako-rivie

komen; ook moet er, volgens hen, in de bovenstreken van de Reteh-rivier een weg zijn, die naar de Batang-Hari of Djambi-rivier voert.

Aan boord's Gouvernements Stoomschip Indragiri.

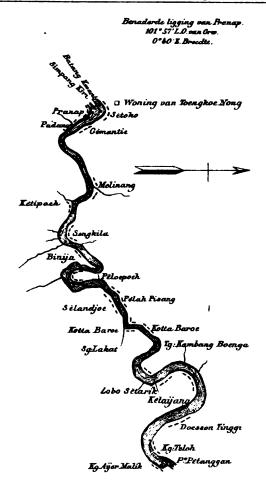
Riouw, 1 November '89.

AANWIJZINGEN VAN DE PEILSCHAAL VOOR RINGAT, UIT-GEDRUKT IN RIJNLANDSCHE VOETEN.

Jaartal.	Maanden.			Dat				
		5	10	15	20	25	80	Aanmerkingen.
1886 1887 1888	September October November December Januari Februari Maart April Mei Juni Juli Augustus September October November December Januari Februari Maart April Mei Juni Juli Augustus September October November December Januari Mei Juni Juli Augustus September October November December Maart April Mei	8 13 15 12 15 14 15 15 16 4 5 5 5 14 15 16 16 16 16 15	9 10 16 8 16 9 11 14 15 4 6 5 5 10 10 14 16 18 14 11 6 10 10 14 8 16 12 15 13	5 5 12 6 16 8 14 14 8 4 4 6 5 5 10 17 18 14 8 5 7 10 12 13 16 13	7 12 7 6 16 9 16 15 5 4 4 6 5 5 12 13 12 10 18 18 12 9 4 3 11 9 16 16 16 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	11 8 13 10 16 12 16 13 5 4 4 10 7 11 1 15 14 13 19 18 10 7 4 6 6 12 8 11 17 17 16 16	12 11 15 14 16 15 16 16 17 17 11 15 16 16 16 16 16 16 16 16 16 17 16 17 17 16 17 16 16 16 16 16 16 16 16 16 16 16 16 16	De gemiddele diepte bedraagt vor de Controleurs-we ning te Ringat, in orivier 3 voet meer en de grootste diep op die plaats 4½ vor meer dan de perschaal aangeeft. On de droogste plaatse in de rivier, zoom bij Lobo Tanggoh e Danau Baroe, word 2 voet water minde aangetroffen dan op eilschaal aanwijst.

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Tijdschrift van het K.Ned Aardrijkskundig Genootschap 1890.



SCHETSKAART
van de
BATANG KWANTAN
van af
P! PETANGGAN TOT KG: PRANAP
door H.B. de Boer.
Schaal 1:250000

Echruari 1890.

FIRMA E.J.BRILL TE LEIDEN.

19272 Me Decoude

VERVOLG

OP DE

BESCHRIJVING VAN DE INDRAGIRI-RIVIER.

Om in het West-vaarwater van Po. Petanggan het meeste water te behouden, moet, zoodra de bank aan den N. W. hoek van het westelijk Petanggan-eiland gepasseerd is, kort onder de kust van dat eiland gestoomd worden, en nadat de Zuidpunt van het eiland Oost gepeild is, kan men, met recht Zuid als koers, tot midden in de rivier loopen, alwaar dan spoedig 3 Rijnl. voet water meer gevonden zal worden dan op de droogste plaats in die passage, n.l. West van de zuidpunt van het eiland.

Van af P. Petanggan wordt de rivier weder breeder en bevaarbaar, zooals de bewoners van Kg. Aijer-malik mij ook reeds vroeger meêdeelden.

Men kan tot de Kg. Lobo Sětarik midden in de rivier stoomen, alwaar dan eene vrijwel gelijke diepte zal gelood worden, n.l. drie voet meer dan op de droogste plaats in de geul van de Pětanggan-passage.

Van af de Kg. Lobo-Setarik moet men in de bochten stoomen; de diepten zullen dan bij dezen waterstand van 18 tot 25 Rijnl. voet afwisselen totdat voor Pranap in 3 vaam geankerd wordt.

Van af Petanggan bestaan de banken grootendeels uit grint en voor Pranap is dat ook gedeeltelijk het geval met de bedding der rivier.

Het verdient daarom aanbeveling voor Pranap, ook met het oog op de stroomsnelheid aldaar, voor beide ankers ten anker te komen, of wel een tros op den wal uit te brengen tot steun van het anker.

Van af Pranap is de Batang-Kwantan voor stoomscheepjes met een diepgang van 6 à 7 voet, bij dezen waterstand, nog ongeveer 4 uur stoomens tot de kampong Tjerinti bevaarbaar; men moet dan eerst de Simpangkiri in, om vervolgens door de troessan Simpang-kanan, weder in de hoofd-rivier te komen.

Van af de bovenbedoelde troessan wordt de Simpang-kiri steeds smaller en ondieper, en is met laag water, voor kleine prauwtjes zelfs onbevaarbaar.

Met hoogwater daarentegen kunnen de Simpang-kiri en de Batang-Kwantan met eene stoombarkas nog enkele dagen opgevaren worden.

Voor stroomsnelheid gaven de patent en de gewone log als volgt aans n. l. te Pranap 3, te Petanggan $2^{1}/_{2}$, te Djapoera $2^{1}/_{4}$ en te Ringat 2 geogr. mijlen in de wacht.

Van af Ringat werd tot Pranap 19 uren gestoomd, terwijl over de terugreis naar Ringat slechts 8 uur gedaan werd; de log gaf als gemiddelde vaart aan gedurende die reis 6¹/₄ geogr. mijl in de wacht.

Het is mij nu gebleken, dat men te Ringat hoegenaamd niet oordeelen kan over den waterstand in de bovenrivier; het volgende kan daartoe als bewijs strekken.

Met stilstand-water, werd den 22 November 1888 te Ringat, op 't oogenblik van vertrek, voor de Controleurs-woning — de gewone ankerplaats — 14 Rijnl. voet gelood; den volgenden dag werd op het droogste gedeelte in de geul van de Petanggan-passage 5½ voet gevonden, en ook stilstand-water. Op den 8 Februari 1890 werd met rijzend water op de ankerplaats te Ringat op 't oogenblik van vertrek 12 voet, dus 2 voet water minder gelood dan vroeger, doch den volgenden middag werd op genoemde plaats in de Petanggan-passage, waar vroeger 5½ voet gevonden werd, nu 15 voet, dus 9½ voet meer water gelood.

De oorzaak van dit verschil in diepten, werd mij te Pranap duidelijk. Het gebeurt namelijk meermalen, dat de rivier in één etmaal 6, ja zelfs meer voeten te Pranap reeds gezwollen is, terwijl dan op dienzelfden dag te Petanggan weinig of geen rijzing van de rivier is waar te nemen en te Ringat het water nog sterk aan 't zakken is.

Men mag gerust aannemen, dat, indien te Pranap het water stijgt eerst één etmaal later te Petanggan, en ruim drie etmalen later te Ringat rijzing der rivier merkbaar is.

Ter voorkoming van met het vaartuig te worden ingesloten, is het zeer aan te bevelen, om gedurende de reis in de Batang-Kwantan, steed nauwkeurig de geloode diepten op te teekenen, en bij de kampongbewoners te informeeren, of het water rijzend, dan wel vallend is.

Is men bijv. gedurende den drogen tijd bij rijzend water — met 2 voed water onder de kiel — over de ondiepe plaatsen zooals bij Danau Barot en Petanggan gekomen, dan moet men, zoodra te Pranap het water begint te vallen, onmiddellijk terugkeeren.

Zooals de schetskaart aangeeft, worden van af Petanggan enkele het veltjes in de nabijheid der oevers aangetroffen, die eene hoogte van 15 tot 50 meter bereiken.

De kampongs zijn hier over 't algemeen grooter en beter bevolkt dan lie in de beneden rivier, en de geheele landstreek heeft een schooner en ruchtbaarder aanzien.

Het laag gelegen terrein dat men hier aantreft, staat met hoogwater cheel onder; zelfs te Pranap gebeurt het, dat met hoogwater, de huizen ie bijna alle op palen een eind boven den grond gebouwd zijn, alleen et een sampan te bereiken zijn.

Aan boord's Gouvernements Stoomschip Indragiri.

Riouw, 27 Februari 1890.

H. B. DE BOER.

Eenige opmerkingen betreffende de zoogensamde "orang loeboe" op Sumatra's Westkust.

Volgens het handboek van prof. J. J. de Hollander (Handleiding voor de land- en volkenkunde van Ned. Indië) komen de orang loeboe, die door sommigen als de nakomelingen der oorspronkelijke bewoners van Sumatra worden beschouwd, alleen voor in de onderafdeeling Groot-Mandheling der Residentie Tapanoeli.

Geheel volledig is die mededeeling niet; ook in de afdeeling Padang-Lawas (res. Tapanoeli) treft men thans nog "orang loeboe" aan. Ze hebben hun woonplaats aan de noordelijke en oostelijke helling van het Maleja-gebergte (scheidingsgebergte van het Zuiden der afdeeling Padang-Lawas met de onderafdeeling Groot-Mandheling) en zijn onderhoorig aan het hoofd van Djandji Lobi (Oeloe Broemon).

Den naam van Loeboe ontleenen zij waarschijnlijk aan de rivier van dien naam, die in het Maleja-gebergte ontspringt en als een der bronzivieren van de Rokan kanan kan worden beschouwd. 't Is echter even goed mogelijk, dat de rivier den naam van den aan hare oevers wonen den volksstam gekregen heeft.

De oorsprong der "orang loeboe" ligt nog altijd in het duister; met zekerheid kan men echter zeggen, dat ze niet van Batahsche origine zijn hun voorkomen zoowel als hun taal duiden dit voldoende aan. De in de afdeeling Padang-Lawas voorkomende loeboe's wonen nabij Djandji Lob in het bosch, afgescheiden van de overige, Bataksche bevolking. Zij hou den zich daar bezig met ladangbouw en inzameling van boschproducten waarvan ze een groot deel aan hun meester, het hoofd van Djandji Lob hebben te leveren.

Nog zoo lang niet geleden leefden ze als wilden; hun eenig klee dingstuk bestond uit een lap van boomschors (tangki), hun voedsel ui djagoeng (mais), bladeren van boomen enz., terwijl ze zich door midde van blaasroeren met kleine pijlen, die door indompeling in het sap vat den ipoeboom vergiftigd gemaakt waren, van wild voorzagen. Thans i die toestand veranderd. Al leeft het grootste gedeelte nog afgezonderd velen zijn reeds naar de vlakte verhuisd en hebben zich in daar bestaand kampongs gevestigd.

Hun kleeding is thans dezelfde als die der overige bewoners dezer stre ken; ze spreken Batahsch en volgen in alles de Batahsche gewoonten et instellingen. Zelfs hebben ze zich in marga's verdeeld, hoewel die indeeling oorspronkelijk bij hen ten eenemale onbekend was.

Het uiterlijk der "orang loeboe" verschilt van dat der Batahs; ze zijn kleiner en hebben breede aangezichten.

In Oeloe Broemon, waar ze door de overige bevolking "halak dolok" d.i. bergmenschen geheeten worden, verkeeren ze nog in een staat van halve slavernij.

Ze zijn geheel afhankelijk van het hoofd van Djandji Lobi, doch het is mij niet mogen gelukken te ontdekken hoe ze in dien staat van afhankelijkheid geraakt zijn.

Verhuizing naar een buiten het gebied van Djandji Lobi gelegen streek is hun verboden, ze moeten in de nabijheid van hun meester blijven; evenwel mogen ze niet worden verkocht, verpand of als betaling van bruidschat worden weggegeven. Zij zorgen voor hunne eigene kleeding en voeding, doch rust de verplichting op hen voor hun meester boschproducten te verzamelen en ter jacht te gaan.

Hun aantal bedroeg, volgens eene in 1886 gehouden telling, ongeveer 100 zielen en zal sedert niet veel zijn toegenomen.

Zij staan onder de leiding van een soort hoofd of oudste, die hun de bevelen van hun meester overbrengt.

In de afdeeling Padang-Lawas, waar nog slavernij bestaat, worden ze onder de slaven gerekend en zijn als zoodanig geregistreerd.

Niet zeer langen tijd zal het meer duren of al de eigenaardigheden en kenmerkende eigenschappen van dezen volksstam, wiens oorsprong tot vele onderstellingen aanleiding gaf, zullen verdwenen zijn en alleen de naam "orang loeboe" zal er aan herinneren, dat eenmaal een van de omringende bevolking in velerlei opzichten aswijkend volk bestaan heeft.

't Is daarom, dat ik, ter aanvulling van hetgeen prof. de Hollander omtrent hen mededeelde, bovenstaande korte opmerking ten beste gaf.

Juni 1890.

CH. E. P. VAN KERCKHOFF

Controleur B. B. met verlof.

NASCHRIFT bij het artikel van Dr. B. HAGEN, in de eerste aflevering van dit tijdschrift (1890).

NACHTRAG:

Bei meiner Rückkehr nach Deli 1890 im März war ich überrascht, in der Schmetterlingsfauna einige Veränderungen zu finden, für die ich bis jetzt noch keine genügende Erklärung habe.

So fand ich, auf einem meiner ersten diesjährigen Ausfluge nach meinem früheren Sammelterrain in Serdang, ein Thier in mehreren Exemplaren, das ich während meines früheren fünfjährigen Aufenthalts daselbst niemals gefunden hatte, nämlich den bekannten Falter Danais chrysippus.

Ferner fand ich in den Gebüschen, welche mein Haus in Labuan umgeben und die von mir und meinen Leuten seit 6 Jahren täglich durchsucht wurden, einen anderen Schmetterling sehr häufig, den ich dort früher niemals gesehen und nur für die waldigen, höher gelegenen Strecken Delis characteristisch gehalten hatte, nämlich Clerome arxsilaus.

Drittens erhielt ich ebendaselbst in Bambudickichten mehrere Exemplare von Debis europa, ein Thier, das ich früher ebenfalls nur aus den höheren Berggegenden kannte.

Uebersehen oder zufällig nicht begegnet kann ich diese Thiere früher unmöglich haben; mein langjähriger Aufenthalt und mein fast tägliches eifriges Sammeln, sowie die Häufigkeit wenigstens der beiden ersten Arten schliesst solches völlig aus.

Dr. B. HAGEN.

CHETS VAN DE BODEMGESTELDHEID VAN DE ZUID-AFRIKAANSCHE REPUBLIEK,

IN VERBAND MET DIE VAN ZUID-AFRIKA

BEWERKT

NAAR DE VOORNAAMSTE BRONNEN TOT 1890

DOOR

G. A. F. MOLENGRAAFF te Amsterdam.

Dit opstel is met kleine wijzigingen ontleend aan een Rapport, door in schrijver op uitnoodiging van het Koninklijk Nederlandsch Aardrijksndig Genootschap opgesteld naar aanleiding van eene geologische peditie, welke het Genootschap voornemens is naar de Zuid-Afrikaansche publiek uit te zenden.

HOOFDSTUK I.

ORT OVERZICHT VAN DE GEOLOGISCHE GESTELDHEID VAN ZUID-AFRIKA.

In dit hoofdstuk wordt een gebied besproken, dat ten Noorden van Westkust van Afrika af tot aan de Limpopo-rivier door den 24sten tedtegraad en verder door die rivier zelve tot aan haar uitmonding den Indischen Oceaan begrensd wordt; de overige grenzen van het bied worden door den Oceaan gegeven. Voor de snelle orienteering rden hier gemakshalve in dit gebied de volgende afdeelingen ondereiden 1): 1. Het gebied van de Zuid-Afrikaansche Republiek

Deze afdeelingen, hier alleen ingevoerd om in het verloop van Hoofdstuk I lange Ichrijvingen en herhalingen te vermijden, hebben verder geen wetenschappelijke Ekenia.

of de Transvaal. 2. Het Zuid-Afrikaansche kustgebergte. Hiertoe wordt het gebergte gerekend, dat zich langs de kust van den Atlantischen Oceaan van de noordgrens van ons gebied langs de Kaap tot aan de Algoa-baai en Great Fish Rivier uitstrekt, min of meer het karakter van een ketengebergte bezit en geologisch gekenmerkt is door de groote ontwikkeling van de primaire formatie. De binnengrens van dit gebied neem ik voor het gedeelte van Great Fish Rivier tot op een punt, gelegen op 30° Z. Br. en 19° O. L. dáár aan, waar de sterke plooing van het gebergte in een zwakkere golving overgaat en de bedekking der oudere afzettingen door de Karrooformatie begint. 3. Het Kalahari-gebied. Hiermede wordt het terrein bedoeld, dat ten Noorden van 30° Z. Br. zich aan de binnengrens van het Zuid-Afrikaansche kustgebergte aansluit en daarmede in geologischen bouw een geheel schijnt uit te maken. Het omvat een deel van Namaqualand, al wat van de Kalahari binnen het besproken gebied valt, voorts het grootste deel van Britsch Bechuana-land en van Griqualand-West. De zuidgrens van dit gebied verloopt van 19° O. L. tot 23° O. L. ongeveer langs den 30sten breedtegraad; verder wordt de grens in een Z. W.-N. O. richting door den Campbell-rand gevormd. De oostelijke zoom van dit gebied in Griqualand-West en Britsch Bechuana-land wordt gewoonlijk Kaap plate au genoemd. De primaire formatie is in dit gebied evenals in het aangrenzende kustgebergte met N.-Z. strekking geplooid. 4. Het Karroobekken. Hiertoe behoort het plateau, dat door de drie vorige gebieden wordt ingesloten (feitelijk behoort het Z.O. deel van de Zuid-Afrikaansche Republiek ook tot het Karroobekken).

De primaire- en de Kaapformatie.

Het grondgebergte (basement-rock, Green (7)) van Zuid-Afrika bestaat uit graniet, waarmede een stelsel van vermoedelijk azotsche of misschien silurische gesteenten (kristallijne leien en vooral klei-leien) innig verbonden is. Door vele geologen wordt aangenomen, dat de graniet intrusief is en zich wellicht bij het vouwingsproces der leien een doortocht heeft gebaand. Daarentegen meent Moulle (1), dat de Graniet in Zuid-Afrika het eigenlijke grondgesteente en ouder dan de gevouwen leien is; slecht voor enkele plaatsen, bijv. bij den Tafelberg neemt hij een indringen van graniet in lei aan, doch hij gelooft, dat deze intrusieve graniet van jonger datum is dan die van het grondgebergte. Het sterkst zijn de gesteenten van deze Zuid-Afrikaansche primair-formatie aan de west- en zuidkust gevouwen, waar zij nu langs de kust en in het met

de kust nagenoeg evenwijdig verloopende ketengebergte veelvuldig aan de oppervlakte voor den dag treden. De strekking der gevouwen lagen is in het geheele Zuid-Afrikaansche kustgebergte met de kustlijn evenwijdig. In het oostelijk deel van Namaqualand, in Britsch-Bechvana-land en in Griqualand-West kan men deze formatie met N.-Z strekking vervolgen; nog oostelijker treedt zij in de Zuid-Afrikaansche Republiek weder over eene groote uitgestrektheid voor den dag en is hier met Oost-Westelijke strekking geplooid. De leien van deze primair-formatie, die in het kustgebergte van Zuid-Afrika doorgaans door de sterke plooiing een steilen of loodrechten stand bezitten, worden hier Malmesbury-beds (naar de stad Malmesbury) en benoorden 32° Z. Br. in Namaqualand Namaqualand-schists genoemd. De leigesteenten van de primaire formatie in de Z. A. Republiek vat Schenck (8) samen onder den naam van Swasielagen (naar Swasieland). De geologische gelijkwaardigheid van deze twee formaties is nog niet bewezen, doch wel waarschijnlijk. Het contact tusschen de lei en de graniet en de contactmetamorphosen, tot een gneisachtig gesteente of veelvuldig tot knoop- of wuchtlei, zijn het uitvoerigst door Darwin (2), Hochstetter (4) en Cohen (5) beschreven. Merkwaardig is de diep ingrijpende verweering der kleileien tot een lateriet-achtige klei, die de makrostructuur der leien heeft behouden. Terwijl in het Westen en Zuiden van Zuid-Afrika boven den 30sten breedtegraad gneis 1) en zuidelijker de Malmesburyleien (langs de zuidkust ten Oosten van de Kaapstad vooral ook phylliet en talklei) in het gevouwen kustgebergte de hoofdrol spelen en graniet slechts hier en daar voorkomt, schijnt een langwerpige, met de lengteas van Oost naar West gekeerde, kern van graniet een groot deel van den Transvaalschen bodem te vormen. Tegen deze granietkern liggen in het noordelijk deel van de Z.-A. Republiek (vooral benoorden de Makapansbergen) en zuidelijker in de Kaapvallei en in Swasieland de leien (Swasie-lagen) met O. W. strekking geplooid. (Schenck 8). Ook komt in Zuid-Afrika graniet als grondgebergte nog in rivierinsnijdingen in Zululand en Natal onder jongere sedimenten voor den dag (Griesbach 6). Noemden wij tot nu toe op autoriteit van de meeste geologen, die zich met het onderzoek van den bodem van Zuid-Afrika hebben bezig-

¹⁾ Gürich (112) noemt als hoofdgesteenten van Damara- en Namaqualand gneis met baschengevoegde lagen van amphiboliet, glimmerlei en verwante gesteenten, en verder verscheidene granietmassieven.

gehouden, deze oudste formatie van leien en graniet de primaire, in tegenstelling met de daaropvolgende sedimenten, die waarschijnlijk geen van alle ouder dan Boven-silurisch of Onder-Devonisch zijn, toch mag men niet uit het oog verliezen, dat vele bekende geologen, als Hoch stetter (4), Rubidge (13, 14, 15) en met hen vroeger ook Rupert Jones (16) deze oudste afzettingen met een gedeelte van de door om als jongere afzettingen onderscheidene Kaapformatie vereenzelvigen en in het Devoon een plaats geven. Moulle (1) rekent de leigesteenten van Namaqualand, en de glimmer-, talk- en kleileien van de kuststreek van Natal tot de kristallijne leien (schistes métamorphiques); de Malmesburybeds tot de Cambrische periode. Dunn (57) beschouwt de Namaqualand-schists, de oudste leigesteenten van Natal en de Swasielagen in de Transvaal als ouder dan Silurisch, de Malmesbury- en Lijdenburg Bedaals Silurisch. Fossielen zijn tot op heden nergens in de Zuid-Afrikaansche primaire formatie gevonden.

In het gebied van de primaire formatie spelen, behalve lokale (dikwijls zooals in Namaqualand zeer talrijke) gangen van diabazen, dioriet, graniet of kwartsporphyr, eruptieve gesteenten alleen een belangrijke rol in de Zuid-Afrikaansche Republiek, waar bij de Pielaandsbergen groote hoeveelheden kwartsporphyr door de granietkern aan de oppervlakte zijn gebracht. Ook het interessante melaphyr- en kwartsporphyrgebergte, de Lobombo-keten, ligt in het gebied van de primaire formatie. Toch is deze kwartsporphyr allicht niet van ouder datum dan die, welke langs de Hartrivier en in Britsch-Bechnana-land in het gebied der Kaapformatie voorkomt. In de Swasielagen zijn voorts gangen en Decken van diabaas en melaphyr talrijk.

Discordant op deze oudste formatie rust in geheel Zuid-Afrika een reeks lagen, meestal zandsteenen, kwartsieten, grauwacken, zandige leien en dolomieten, die men als de Kaapformatie (Schenck 8) mag samenvatten.

De primaire met de haar bedekkende Kaapformatie strekt zich in het hier besproken gebied van Zuid-Afrika als een reusachtige aan de oost zijde geopende ring uit. De buitengrens van dezen ring wordt aan de noordzijde door de noordgrens van ons gebied en verder aan de westen zuidzijde door de kust langs de Kaapstad tot aan den mond van de Great Fish Rivier gevormd. De binnengrens loopt van den mond van de Great Fish Rivier in nagenoeg zuiver O.-W. richting tot bij Karroopoort om dan tot een Z.-N. richting om te buigen, welke richting ongeveer tot den 30sten breedtegraad dezelfde blijft; verder verloopt deze binnen-

grens west oostwaarts tot op de plaats, waar de Oranjerivier, uit het Karoobekken tredend, het Kaapplateau doorbreekt, en vervolgens langs de Oranje- en Hartrivier en daarna ongeveer evenwijdig met de Vaalnivier in W.-O. richting door het zuidelijk deel van de Transvaal. Bovendien schuift zich van uit Swasieland nog een smalle tong van gesteenten
van de primaire- en Kaapformatie langs de kust zuidwaarts tot bij de
St. John's rivier. De groote langwerpige ruimte, die binnen den ring van
de primaire- en Kaapformatie overblijft en met jongere afzettingen opgevuld is, zullen wij als het Karroo-bekken leeren kennen.

Veelal liggen de lagen der Kaapformatie horizontaal en vormen dan plateau's (tafelbergen) boven op de gevouwen lagen der primaire formatie; op andere plaatsen, zooals bijv. aan de binnenzijde van het Zuid-Afrikaansche kustgebergte en in de Transvaal zijn de lagen van de Kaapsomatie in dezelfde richting als de onderliggende primaire gesteenten gevouwen, doch steeds veel minder sterk, zoodat hier groote troggen (Mulden) en zadels gevormd zijn, waarvan de hellingen niet meer dan 45° bedragen. De strekking der lagen is diensvolgens in de Transvaal en langs de zuidkust O.-W., langs de westkust en in het Kalahari-gebied nagenoeg N.-Z. In het Zuid-Afrikaansche kustgebergte en in het geheele plateauland van Zuid-Afrika worden de lagen van de Kaapformatie meestal hoog boven de oppervlakte der zee gevonden bijv. Groote Winterhoek-bergen bij Uitenhage 1800 M., Koude Bokkeveld-bergen 1925 M., Mauchberg 2190 M., Spitzkop 1710 M. (bij Lijdenburg), het grootste gedeelte van het Kaapplateau ± 1100 M. Dicht langs de kust bijv. in Natal is dit niet het geval. Hier bepaalde Griesbach (6) de uiterste hoogte van de Kaapformatie op 400 M. Zeer waarschijnlijk zijn schollen van de Kaapformatie hier door een reeks van trapbreuken (Staffelbruche) in een lager niveau gebracht.

In Zuid-West-Afrika mag men in de lagen der Kaapformatie de volgende onderafdeelingen onderscheiden:

KAAPFORMATIE IN ZUID-WEST-AFRIKA.

AARD DER GE- STEENTEN.	PLAATSEN, WAAR HET VOORKOMEN MET ZEKERHEID BEKEND IS.	GEOLOGISCH TIJDPERK.
Blauwzwarte, dolomitische kalksteen.	Han-Ami-plateau (Schenck 8). Campbell-rand, Kaapplateau (Schenck 8). Lange berg op het Kaapplateau	Carboon?
	(Anderson 9).	,

Kwartsiet, waar- schijnlijk aequiv. met Witteberg- zandsteen.	Zuurbergen en oostelijk deel van de Zwartebergen (Dunn). Wittebergen, Cedarbergen, westelijk deel van de Zwartebergen (Bain 3) enz.	Boven- Devoon?
Grauwacken en zandige leien.	Bokkeveld (Bain 3, Cohen 5, Gurich 19).	Devoon, waarschijnlijk Onder- Devoon.
Tafelberg- zan dsteen.	Olifantsbergen, Tafelberg bij Kaap- stad, Drakensteinbergen, Lange bergen bij Swellendam enz.	Onderste Devoon of Siluur.

In de Zuid-Afrikaansche Republiek onderscheidt Cohen (10):

Dolomiet.
Zandsteenbanken, die met leigesteenten en groensteen afwisselen.

Hooge Veld bewesten Potchefstroom,
Spitskop bij Lijdenburg.
Hoogste gedeelte van het Randgeberd heid bekend.
dan 1200 M.

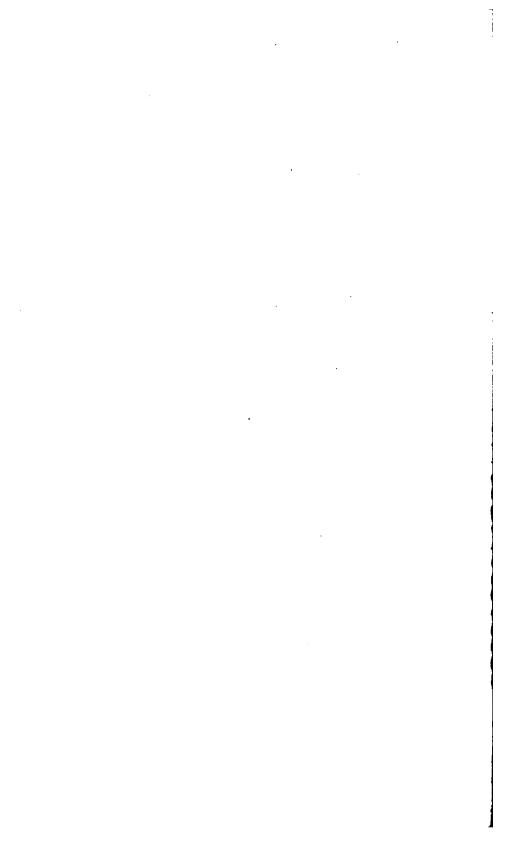
Hoewel het tot nog toe niet gelukt is, onderafdeelingen uit de Kaapformatie in de Transvaal met die uit de veel nauwkeuriger onderzochte Kaapformatie in de omgeving van de Kaapstad te parallelizeeren, is toch de Kaapformatie in de Transvaal waarschijnlijk wel gelijkwaardig met die van het Zuid-Afrikaansche kustgebergte. Hiervoor pleit het feit (volgens Schenck 8), dat de dolomieten in het Zuidwesten van de Transvaal in onafgebroken verband met de dolomieten van den Campbellsrand op het Kaapplateau staan; bovendien schijnt het petrographisch karakter en de algemeene wijze van voorkomen van de Kaapformatie in de Noord-Transvaal zeer met die van de Kaapformatie in het Zuid-Afrikaansche kustgebergte overeen te komen. Om deze reden verdient het aanbeveling deze beide formaties met Schenck voorloopig onder één naam te vereenigen. In de Zuid-Afrikaansche Republiek zijn tot nu toe geen fossielen in de Kaap-formatie gevonden. Ook in Zuid-Afrika heeft de onderste afdeeling, de Tafelbergzandsteen, tot nu toe geen bestembare fossielen opgeleverd. De Bokkeveld-lagen zijn daaren-

gen in het Warme Bokkeveld, aan de Cedar-bergen en op indere plaatsen nu en dan rijk aan fossielen en leveren daar een over oote afstanden gemakkelijk herkenbaar horizon. Bain (3) rekende eze lagen, doch onder voorbehoud, met de zandsteenen, die er op sten, tot het Boven-Siluur en dientengevolge de Taselbergzandeen tot het Onder-Siluur. Latere, nauwkeurige determinaties der ssielen uit de Bokkeveld-lagen hebben bewezen, dat zij tot het Devoische tijdperk behooren. Vooral de onderzoekingen van Sandberer (11), Salter en Sharpe (12), Woodward (17) en anderen ebben dit pleit beslecht. In den hierop rustenden Wittebergzandteen en zijne aequivalenten zijn hier en daar dunne steenkolenlaagjes evonden; zoowel deze als enkele lagen in den Zuurberg-kwartsiet ebben plantenoverblijfsels geleverd, die aan het steenkolentijdperk eigen in. Toch moet men er zich voor wachten, deze lagen zonder meer tot et Carboon te rekenen. Feistmantel (108) geest in zijn jongste erk een kritisch overzicht over de plantenoverblijfsels, die met zekereid uit deze afzettingen bekend zijn en komt (l. c. pag. 26 en 27) tot et besluit, dat deze formatie stellig tot het Carboon en zelfs eerder t het Boven-Carboon dan tot het Onder-Carboon (Culm) oet gerekend worden. Gürich (111) echter betoogt, dat men althans het zuidelijk halfrond uit het vinden van eenige carbonische typen et tot het voorkomen van Carboon mag besluiten en dat uit stratiaphische gronden een devonische ouderdom van den Witteberg-zandsteen ter waarschijnlijk moet geacht worden; ook Feistmantel verwerpt mogelijkheid hiervan elders (108 p. 87) niet geheel.

Eruptieve gesteenten verkrijgen in het gedeelte van de Kaapformatie, dat te het Zuid-Afrikaansche kustgebergte behoort, nergens eene groote beteenis; in het oostelijk deel van het Kaapplateau 1) daarentegen en in het daaran grenzende zuidwestelijke deel van de Zuid-Afrikaansche Republiek vorden zij het hoofdbestanddeel van den bodem; in het gebied tusschen de lart- en Vaalrivier bestaat de bodem bijna geheel uit melaphyr en metphyr-amandelsteen, welke gesteenten volgens Cohen (17 en 18) door gen van de Kaapformatie worden bedekt. Ook is de Kaapformatie in et oostelijk hooggebergte (Randgebergte) van de Zuid-Afrikaanche Republiek rijk aan diabaas, welk gesteente hier talrijke platen Decken) tusschen de zandsteenbanken vormt (Cohen 10).

¹⁾ Voor de studie van de ontwikkeling der primaire- en der Kaapformatie in het Kaapfor

Worden de weinige hier opgenoemde feiten nu ook al geologen erkend, omtrent de verklaring der feiten bes verschil van meening. De groote verdeeldheid wordt hier dat in de zeer uitgestrekte, verscheidene duizend Metez Kaapformatie slechts ééne betrekkelijk dunne reeks van la veldlagen, voorkomt, die bestembare fossielen levert en de punt voor de stratigraphische orienteering kan dienen. R Bokkeveld-formatie slechts op zeer weinig plaatsen in v lagen, die er onder liggen en er op rusten, onderzocht. 🖪 de theorie van den bouw van de Kaapformatie op de slechts weinige profielen; onder deze mag het Ceres-profiel van Zuid-Afrika klassiek genoemd worden. De afbeelding geven in grove trekken enkele der verklaringen, die van h zijn gegeven, terwijl in Bijlage B nog iets vollediger de opinies omtrent de opeenvolging der lagen van de pe Kaapformatie bijeen zijn gebracht. Wanneer men zich* Pl. I gedeeltelijk afgebeelde lijn van de Kaapstad nas land beweegt, vindt men aanvankelijk over het algemee der dalen en laagten door graniet of kleileien (de Mala de bergen echter door zandsteen (Tafelbergzandsteen) naar het binnenland voorbij Ceres vindt men in de dale en leien met fossielen (de Bokkeveld-leien), terwijl de de bergen wederom uit zandsteen (de Wittebergzandsteen) bet de Bokkeveldleien rust. De geheele strijd beweegt zich nu volgende vraagpunten: "Zijn de Malmesbury-leien aequiw Bokkeveld-leien en grauwacken of zijn de laatsten jonger Wittebergzandsteen van gelijken ouderdom als de Tafel of jonger?" — Beide vraagpunten worden in hoofdzaak genen zin beantwoord, al naarmate men aanneemt, dat zandsteen bij Ceres met noordoostelijke helling onder de Bo wegschiet en deze laatsten daar dus concordant op rusten niet het geval is. Uit de op Pl. I geschetste profielen en uit lage B wordt zonder nadere verklaring duidelijk, op wel probleem door de verschillende onderzoekers is opgelost. He sible schijnt wel de meening te zijn van Gürich (19), w die van Green (7) overeenkomt; in beginsel is deze opvattis dezelfde als de oorspronkelijke van Bain (Profiel 1) en zoover van die van Schenck (8), dat hierbij niet (zooals wil) de Tafelbergzandsteen als een ander facies (strandfac • •



Bokkeveld- en Wittebergleien en zandsteenen wordt beschouwd, maar feitelijk als onderste afdeeling van de Kaapformatie wordt aangenomen. Omdat nu de bouw van de primaire- en de Kaapformatie in het geheele Zuid-Afrikaansche kustgebergte in groote trekken dezelfde is, hebben wij hier niet met een lokaal of onbeduidend, maar integendeel met een zeer gewichtig en verstrekkend probleem te doen. Hieruit volgt dus, dat in het best bekende gedeelte van Zuid-Afrika zelfs de hoofdtrekken van de geologische gesteldheid nog niet onbetwistbaar vaststaan, doch somtijds nog afhankelijk zijn van de persoonlijke waardeering van eenige weinige profielen.

Bij nauwkeurige beschouwing van de bedoelde profielen en nog meer van de lijst op Bijlage B, zal men spoedig zien dat er niet alleen verschil van meening bestaat omtrent de opeenvolging der in de Kaapkolonie voorkomende formaties, maar dat ook de wijze, waarop de formaties met bekende groote geologische afdeelingen nit het noordelijk halfrond worden geparallelizeerd, bij de verschillende onderzoekers zeer verschilt. Verwonderen mag ons dat zeker niet voor een terrein, waar de stratigraphische gegevens nog nvoldoende zijn en waar slechts één systeem, de Bokkeveld-lagen, met ekerheid met een systeem uit het noordelijk halfrond, namelijk met het Onder-devoon op gelijken lijn mag gesteld worden. Doch ook tusschen keze beiden vindt men nog opmerkelijke verschillen. Niet genoeg kan men popmerkingen van Seeley (20) en Schenck (8) toejuichen, die er eiden op wezen, dat het vooral noodig is, eerst het verband tusschen de maties in Zuid-Afrika onderling nauwkeurig te kennen, eer men tot het ergelijken met bekende Europeesche formaties overga. Houdt men toch het oog, dat het meest ingrijpende gevolg van de ontwikkeling van limatische zones op aarde moet geweest zijn de toenemende onafhanelijkheid in de ontwikkeling van de flora's en de fauna's in het noorelijk en het zuidelijk halfrond; bedenkt men voorts, dat deze onafinkelijkheid door verschillende ligging en groepeering der continenten el gewijzigd maar nooit vernietigd kan worden, dan is het duidelijk, t wellicht reeds in het Devonische tijdperk de onafhankelijkheid in de twikkeling van het organisch leven in het noordelijk en het zuidelijk alfrond min of meer was ingeleid.

De Karroo-formatie.

Het Karroobekken, dat aan alle zijden, behalve aan de smalle

kuststreek tusschen St. John's River en Great Fish River, door de oudere gesteenten van de primaire- en Kaapformatie omringd is, is geheel met jongere sedimenten gevuld, welke zeer waarschijnlijk door zoet water zijn afgezet. Reeds in 1844 sprak Bain (33) de onderstelling uit, dat de lagen van het Karroobekken in een groot zoetwatermeer zouden zijn afgezet; bij vele schrijvers vindt men deze voorstelling min of meer uitgewerkt terug (men verg. bijv. Owen 38, p. VI).

Door vele geologen worden in deze afzettingen, die gemeenschappelijk de Karrooformatie genoemd worden, de volgende hoofdasselingen erkend, die ook op de geologische kaarten van Zuid-Afrika van Dunn (25 en 57) en van Schenck (8) zijn aangenomen:

E. J. Dunn
A. Schenck.

Stormberg Beds = Stormberg-schichten

Upper Karroo Beds = Beaufort-schichten

Lower Karroo Beds = Ecca-schichten

Dwyka conglomerate = Dwyka conglomerat.

In het zuidelijk deel van het Karroobekken zijn de lagen van de Karrooformatie met O-W strekking geplooid; hier schijnt het vouwings proces, dat tot de plooiing van het kustgebergte zelve aanleiding gaf, na de afzetting van een deel der lagen van het Karroobekken nog voortgeduurd te hebben. Meer noordelijk wordt de vouwing der lagen van de Karrooformatie steeds geringer en al spoedig vindt men, zooals overal elders in het Karroobekken, de lagen volmaakt of bijna volmaakt horizontaal liggen; alleen valt overal eene zeer zwakke helling in de richting van het centrum van het bekken, te bespeuren. Men zou na mogen verwachten, dat de oudste vorming, het Dwyka-conglomeraat, alleen aan de oppervlakte zal treden aan den rand van het bekken, en daarbinnen in concentrische ringen, de opvolgende jongere vormingen. In werkelijkheid nemen de Beaufort-lagen het midden van het bekken in en worden door de Ecca-lagen en vervolgens door het Dwyka-conglomeraat omgeven. De jongste lagen, de Stormberg-beds, die men nu weder in het midden der Beaufort-lagen zou verwachten, grijpen in noord-oostelijke richting over alle oudere Karroo afzettingen heen, zoodat zij in het zuidelijk deel van de Trans vaal direkt discordant op lagen van de Kaapformatie en iets zuidelijker op de Ecca-lagen rusten. Het schijnt, dat de Ecca-lagen op dezelfde wijze over het Dwyka-conglomeraat heengrijpen en in het geheele noordelijke gedeelte (benoorden 28° Z. Br.) van het Karroo-bekken op lagen

van de Kaapformatie rusten. Noordelijker dan 28° treedt dan ook nergens aan de randen van het Karroo-bekken het Dwyka-conglomeraat voor den dag (Dunn 25). Overigens vormt het een gordel om het Karroo-bekken, die alleen nog een gaping bezit tusschen St. John's River en Great Fish River, waar het Karroo-bekken naar de zeezijde open is en waar de Ecca-lagen zich tot aan de zeekust uitstrekken.

Het geheele Karroo-bekken is rijk aan gangen en platen ("Decken") van eruptiesgesteenten, welke volgens Cohen (55) wel alle tot de diabazen (vooral Oliviendiabaas) en melaphyren moeten gerekend worden. Cohen (55) onderscheidt in de eruptieve gesteenten van het Karroobekken diabaas, oliviendiabaas, diabaasporphyriet en oliviendiabaasporphyriet. Melaphyr, waartoe hij o. a. den eigenaardigen amandelsteen van de Maluti-bergen (18 en 109) rekent, komt overigens niet veel voor. Hij beschouwt de diabaasbanken als intrusies; de juistheid van deze opvatting kon hij op verscheidene plaatsen daardoor aantoonen, dat zoowel boven als onder de banken van eruptieve gesteenten de keien en zandsteenen van de Karroo-sormatie verschijnselen van contactmetamorphose vertoonen, welke overeenkomen met die, welke men elders in de contactzone bij intrusieve graniet veelal waarneemt.

Moulle (1) rekent de eruptieve gesteenten der Karrooformatie tot de melaphyren. Hij zegt dat melaphyre amygdaloide uitgestrekte banken (sappes) in de middelste en bovenste afdeelingen van de Karrooformatie vormt. Hij beschouwt die banken als stroomen, dus als contemporaire uitvloeiingen. Hij rekent hiertoe ook den amandelsteen langs de Vaalrivier (Cohen's Vaalgesteine), welke door Cohen voor veel ouder verden aangezien, en identificeert deze met de hard rock, welke op 85 M. diepte om de Kimberley-mijn is aangetroffen.

In de Karroo-formatie zien wij een systeem van lagen van minstens 3000 M dikte voor ons, voornamelijk bestaande uit horizontaal liggende 22ndsteenen, leien en mergels, veelvuldig door groensteengangen en plaatvormige uitbreidingen van groensteen doordrongen. Het behoeft geen betoog, dat de erosie gedurende de tijdruimte (wellicht sedert het begin van het Jura-tijdperk), dat deze vormingen land waren, uit dergelijke afzettingen een zeer eigenaardig landschap moest modelleeren. Werkelijk zijn dan ook alle gesteenten, die grooteren weerstand aan de erodeerende werking boden, nl. de gangen en platen van groensteen, veelal zorgvuldig uitgepraepareerd; zij zijn op de hoogten, waarop zij zich vroeger in de lagen van het Karroobekken bevonden, gebleven en hebben recht en schuin onder zich reus-

achtige pijlers van de Karroo-gesteenten voor wegvoering beschermd; zij leggen er getuigenis van af, hoe dik eenmaal de gezamenlijke lagen van de Karrooformatie minstens moeten geweest zijn. In werkelijkheid zijn zoowel de geïsoleerde spitse heuvels, de Spitskopjes, als de grootere, steilwandige, platkruinige bergen, de Tafelbergen, op het groote Karroo-plateau niet dan, door de uiteinden van diabaasgangen of door diabaasplaten, die hen bedekken, voor erosie beschermde deelen van het geweldige doch overal elders weggevoerde systeem van leien en zandsteenen van het Karroo-bekken. Uitgestrekte bergreeksen, als de Nieuweveld-, Kompas-, Sneeuw-, Storm- en Drakensbergen, waaronder de hoogste bergtoppen van geheel Zuid-Afrika, zooals de Kompasberg 2500 M., de Machaha Bg. 3500 M., de Mt. aux Sources 3000 M. en de Champagne Castle 3461 M. (114) behooren tot deze eigenaardige bergen van het Karroo-landschap 1). Aan de oostzijde zijn evenwijdig met de tegenwoordige zeekust langs één of meer breuklijnen waarschijnlijk groote schollen van de Karroo-formatie naar beneden gegleden (verg. pag. 583). Enkele van deze gezonken schollen vindt men nu nog terug in de van het Karroo-bekken geheel gescheidene strooken van Karroo-afzettingen, die dicht langs de zeekust op geringe hoogte in Natal en Zululand worden gevonden Suess (22 p. 508). Tusschen deze afzettingen en den steilen, oostelijken rand van het Karroo-bekken zijn in Natal en Zululand lagen van de Kaap- en de primaire formatie door denudatie ontbloot. De zooeven genoemde verschuivingen (Verwerfungen) hebben wel oorspronkelijk aanleiding gegeven tot het ontstaan van den steilen rand, die nu het Karroo-bekken aan de oostzijde begrenst, doch deze rand was voorzeker vroeger veel meer oostelijk gelegen en is daarna door erosie en denudatie westwaarts verplaatst. (verg. Suess (22), Rehmann (23) en Schenck (21)). Te gelijker tijd heeft de erosie rivierbeddingen in diepe, steile dalen in de horizontale lagen doen ontstaan, welke nu het oostelijk deel van het Karroo-bekken afwatering geven. Neemt men hierbij nog in aanmerking, dat de juist beschreven Spitskopjes en Tafelbergen evenwijdig met de oostkust dicht aaneengeschaard staan, en dus aan de terugschrijdende erosie der rivieren hier telkens een zeer ongelijken weerstand wordt geboden, dan kan men zich een denkbeeld vormen, hoe uit het oorspronkelijk vlakke Karroo-landschap in het oostelijk!

Eene belangrijke bijdrage tot de kennis van de erosieverschijnselen in het Karroolandschap is o. a. de jongste verhandeling van Schenck (21).

deel van het Karroo-bekken door erosie een stout en wild bergland is geschapen.

a. Het Dwyka-conglomeraat.

Het Dwyka-conglomeraat (of wellicht beter breccie, Moulle 1, Green 7) bestaat uit talrijke, bont dooreen liggende, groote en kleine agmenten van zeer verschillende, doch alle oude gesteenten (vooral maniet, kwarts, zandsteen en lei uit de Kaapformatie), liggend in een ijakorrelige tot dichte klastische grondmassa, terwijl alles door een ceeent, dat in hoofdzaak uit amorphe kiezelzuur bestaat (C o h e n 55), vast camgevoegd is. De rotsfragmenten zijn zeer verschillend van grootte, neestal wel afgesleten, maar niet geheel afgerond, poorts dikwijls gepolijst en wel eens op de gladde kanten et één of meer systemen van evenwijdige krassen porzien. In textuur en algemeene eigenschappen komt het congloreast veel overeen met den in het noordelijk halfrond (ook in Nedermd) wel bekenden glacialen blokleem uit het diluviale tijdperk. dr, waar het Dwyka-conglomeraat aan bergdruk is blootgesteld getest (bijv. langs de zuidgrens van het Karroo-bekken, waar het Dwykanglomeraat vrij sterk geplooid is) zijn de ingesloten rotsfragmenten kelal gekneusd en gebroken en met de grondmasssa tot een vast, schijnar gelaagd gesteente verbonden (Dunn 25).

Hebben wij bij de behandeling van de primaire- en Kaapformatie eds op eenige nog open vragen moeten wijzen, nog grooter wordt de mekerheid bij de bespreking van het Dwyka-conglomeraat, dat met recht t crux der Zuid-Afrikaansche geologen mag genoemd worden. Reeds de ste vraag, die men zich allicht zal stellen: "Ligt het Dwyka-congloat concordant of discordant op de lagen van de Kaapformatie?" is, vooral uit Bijlage B zal duidelijk worden, in zeer verschillenden beantwoord. De volgende opvatting is wellicht de juiste: De lagen de Kaapformatie strekten zich vroeger over het geheele Karroo-bekuit en eerst door veelvuldige dislocaties vormde zich het bekken, arin de Karroolagen op de neergezonken schollen van de Kaapfortie werden afgezet. Een dezer schollen is in Natal door denudatie geringen afstand van de zeekust ontbloot (Griesbach 6). Liggen nu ook al nu en dan de onderste lagen van de Karrooformatie concornt op de schollen van de Kaapformatie, over het algemeen zal men theen discordante volgorde tusschen de Kaapformatie en troolagen moeten aannemen.

Bestaat er dus reeds verschil van gevoelen over de juiste plaats, die het Dwyka-conglomeraat in het geologische stelsel van Zuid-Afrika moet innemen, in nog grooter mate is dit het geval bij de vraag naa de uitbreiding en de beteekenis van het Dwyka-conglomeraat. Wat de uitbreiding betreft, zij hier slechts dit opgemerkt, dat de onderstelling dat het conglomeraat, dat als basis der Karroovormingen in den bene denloop van de Vaal, in de Kimberley-mijnen en in het Keien-vek (foutief Kaaien-veld op Merensky's kaart 87) gevonden is 1), iden tiek is met de reeds lang als Dwyka-conglomeraat bekende vorming aan den zoom van het Karroo-bekken bij Karroo-poort en westwaart van die plaats, slechts op autoriteit van Dunn (25) hier is weer gegeven. Vele andere geologen, bijv. Stapff (24 en 58) en Greet (7) beschouwen deze beide conglomeraten als twee verschillende von mingen en achten Dunn's meening onbewezen. - En nu nog de vraag "Hoe is het Dwyka-conglomeraat ontstaan?" Baii (3 pag. 186), Wyley (26) en later ook Moulle (1) beschouwen he Dwyka-conglomeraat als een produkt van vulkanische werkzaamheid Bain vermoedde, dat een reusachtige vulkaan, welke, naar hij meende zijn zetel ongeveer op de plaats, waar nu de Vaal zich in de Oranj stort, moest gehad hebben, al deze stoffen had uitgeworpen. Bait noemde het Dwyka-conglomeraat claystone-porphyry, Wyley trap-con glomerate en Moulle Brèche mélaphyrique. Door Sutherland (2) werd het eerst de hypothese opgesteld, dat het Dwyka-congle meraat glaciaal is en een langvervlogen ijstijd i Zuid-Afrika beoorkondt. Zijne hypothese steunt op de groot overeenkomst tusschen het Dwyka-conglomeraat en den Europeesche blokleem en op het feit, dat veelal de lagen van de Kaapformatie, d direkt onder het Dwyka-conglomeraat liggen, geschramden to ware Rundhöcker gepolijst zijn. Hij noemde het Dwyka-congi meraat een boulder-clay. Deze hypothese verwierf zich veel sympath en o. a. sloten Griesbach (6), Dunn (25 en 57), en Schenc (8 en 21) zich bij Sutherland's meening aan. Vooral verkreeg deze hyp these groote beteekenis, toen men het Dwyka-conglomeraat in verba bracht met analoge vormingen in Britsch-Indie (Taltchir-congl meraat) en Australië (de onderste Bacchus-Marsh-Bed en de groote overeenkomst leerde kennen, die tusschen de flora van Ecca-lagen (hierbij werden ook de black-shales en de Kit

¹⁾ Dit is het Vaalconglomeraat (Schenck) = Ancient-conglomera (Stow 56).

berley-shales, dus de Lower-Karroo-Beds van Dunn bedoeld), die in Zuid-Afrika op het Dwyka-conglomeraat rusten, en de lagen van het Gondwanasysteem, die in Indie op het Taltchir-conglomeraat (nl. de Táltchir-leien en de Karharbári-lagen, Feistmantel 108) en den zandsteen, die in Australië (Victoria) op de onderste Bacchus-Marsh-Beds volgen, bestaat. De studie hiervan, waarvoor vooral de werken van Feistmantel (31 en 108), Blanford (28 en 29), Oldham (30), Neumayer (27) en anderen van belang zijn, gaf aanleiding tot de hypothese van het voormalig bestaan van een groot continent, dat omstreeks het einde van het Carbonische tijdperk Zuid-Afrika met Indië en Australië verbond en tot de hypothese van een ijstijd in het Zuidelijk halfrond in het laatste gedeelte van het Carbonische of in het begin van het Permische tijdvak. In Feistmantel's verhandelingen vindt men zeer uitvoerige literatuuropgaven over deze belangrijke kwestie. Enkele geologen, bijv. Green (7) houden het Dwyka-conglomeraat voor een strandvorming, ontstaan bij de transgressie van de zee over de lagen van de Kaap-formatie bij het begin van de afzetting der Karrooformatie (l. c. p. 267). Green houdt zoowel het Dwyka-conglomeraat als de Ecca-lagen voor marine afzettingen.

b. De Ecca-lagen of Lower Karroo-Beds.

De Ecca-lagen (hier in den zin van Schenck) of Lower Karroo-Beds (Dunn) rusten concordant op het Dwyka-conglomeraat en er schijnen overgangen tusschen beiden bekend te zijn. De Ecca-lagen, die uit het midelijk deel van het Karroo-bekken bekend zijn, zijn waarschijnlijk aequivalent met de Olive-shales (Stow 56) en de Kimberleyshales (Green 7) uit Griqualand-West en met de Pietermaritzburg-leien uit Natal. Zij bestaan voor een groot deel uit zwarte of donkergekleurde leien, de black-shales, die een spaarzame maar eigenaardige flora (de Glossopteris-flora Feistmantel 31) bezitten. Deze leien zijn steeds rijk aan kooldeeltjes, welke in het Zuiden door bergdruk veelal in Graphiet veranderd zijn. Hier en daar zijn in deze keien steenkolenbeddingen gevonden en Dunn (25) meent, dat deze eene groote uitgebreidheid bezitten en in de toekomst eene groote beteekenis zullen erlangen. Op deze donkere leien rusten gewoonlijk licht gekleurde, geele of grijsachtige, dikwijls zandige leien. Deze zijn op vele plaatsen (bijv. de y ellow-shale van de Kimberley-mijnen) wel door ontleding onder atmospherische invloeden uit de blackshale ontstaan 1). De Lower-Karroo-beds worden gemeenlijk tot het Boven-Carboon of Perm gerekend.

c. De Beaufort-lagen of Upper Karroo-Beds (Dunn).

De Beaufort-lagen rusten op de Ecca-lagen. Eenige geologen (Bain 3, Dunn 25 en Schenck 8) nemen een concordante ligging der Beaufort-lagen op de Ecca-lagen aan, anderen een discordante (Green 7, Feistmantel 31, Rupert Jones 54 e. a.). De eersten rekenen het conglomeraat, dat onder de Kimberley-shales ligt, en in het Kimberley-district den basis van de Karrooformatie uitmaakt, als aequivalent met het Dwyka-conglomeraat en de Kimberley-shales aequivalent met de black shales in de Kaap-kolonie en brengen dus beide in de Ecca-of Lower Karroo-beds; de laatsten nemen aan dat de Kimberley-shales en het daar onder liggende conglomeraat jonger zijn dan de Ecca-lagen, daar discordant op rusten, en als de onderste afdeeling van de Upper Karroo-beds moeten worden opgevat. De Beaufort-lagen bestaan hoofdzakelijk uit kleileien, zandige leien en zandsteenen. Zij herbergen eene door eigenaardige Reptilia (waarschijnlijk wel alle zoetwaterbewoners) gekenmerkte fauna, die wel eens naar een der hoofdgenera de Dicynodon-fauna wordt genoemd, en eene landflora, welke met die der Ecca-lagen overeenkomt en rijk is aan representanten van het genus Glossopteris (Feistmantel 108). De stratigraphische en palaeontologische litteratuur over de flora en fauna van de Beaufort-lagen is zeer uitgebreid; de voornaamste bronnen zijn de verhandelingen van Bain (33), R. Owen (32, 36, 40), Tate (42), Huxley (35), Rupert Jones (37, 39 en vooral ook 38), en Feistman'tel (108). De Beaufort-lagen worden gewoonlijk in de Trias gebracht en volgens Feistmantel zouden zij de geheele Trias-formatie omvatten.

d. De Stormberg-lagen.

Op de Beaufort-lagen rusten concordant de Stormberg-lagen. Zij bestaan hoofdzakelijk uit dikke banken van zandsteen, welke veelvuldig met koolhoudende leien en koollagen afwisselen. Uit de Stormberg-lagen zijn vele plantenoverblijfsels, enkele visschen, Reptilia en een zoogdier de Tritylodon langaevus, Owen bekend. Deze Tritylodon,

¹⁾ De Lower Ecca-beds in den zin van Rupert Jones (54), welke onder het Dwykaconglomeraat zouden voorkomen, worden door anderen of tot de Kaap-formatie gerekend of ook wel in het geheel niet genoemd.

waarvan een schedel (zonder de onderkaak) bewaard is gebleven, vertoont het meest verwantschap met den Microlestes antiquus Plien. uit de Keuper in Wurtemberg, het oudste bekende zoogdier uit Europa (Owen 113). De flora, welke onlangs door Feistmantel (108) uitvoerig en kritisch is beschreven, bestaat vooral uit varens, Cycadeën en Coniferen en maakt een boven-triassischen of misschien onder-jurassischen ouderdom voor deze lagen waarschijnlijk. In de onderste étage van deze afdeeling van de Karrooformatie, de Molteno-beds, komen talrijke steenkolenbeddingen voor; hiertoe behooren alle beddingen, die in de Oranje-vrijstaat, Natal1) en de Transvaal worden geëxploiteerd. Het is nog niet bekend of deze beddingen met elkaar in verband staan of slechts lokale afzettingen vormen. De litteratuur over de Stormberg-lagen is zeer veelzijdig; er zij hier slechts voor de palaeontologische gegevens op de werken van Woodward (59), Huxley (41), R. Owen (38), Tate (42), voor de stratigraphische gegevens op die van Green (45) en Moulle (1), en voor de steenkolenbeddingen in het bizonder op die van North (43), Dunn (44) en Penning (46) gewezen.

De onderafdeelingen, welke in de hoofdafdeelingen van de Karrooformatie door verschillende onderzoekers gemaakt worden, zijn in Bijlage B opgenoemd.

De Uitenhage-formatie.

In het binnenland van Zuid-Afrika, ook in de geheele Transvaal, rusten op de tot nu beschouwde lagen slechts recente vormingen. Alleen langs de kust vindt men nog eenige afzettingen, die tot Jura of Krijt gerekend worden. Zij rusten discordant op de andere lagen. Vooreerst behoort hiertoe de Uitenhage-formatie. Feistmantel (108 p. 74) beschouwt de Uitenhage-formatie als de bovenste afdeeling van de Karrooformatie en heeft hierover een verhandeling toegezegd. De lagen van deze formatie vormen bij de Algoa-baai ongeveer 200 M. dikke afzettingen van zandige gesteenten. Deze worden doorgaans (Tate 42 en Rupert Jones 54) tot het Jura-tijdperk, somtijds echter ook op antoriteit van Krauss (48) tot het Onderste Krijt (Neocoom) gebracht 2).

Feistmantel brengt een gedeelte van de koolbeddingen in Natal in de Beaufortlagen (108).

²⁾ Uit de talrijke publicaties over de Uitenhage-formatie en hare versteeningen mogen hier die van Sharpe (52), Hausmann (47), Krauss (48), Tate (42), Atherstone (49), Stow (50), Holub en Neumayer (51) genoemd worden.

De Utamfuna-lagen (Schenck).

Deze lagen worden dicht aan de kust op eenige plaatsen in Natal en aan de St. Lucia-baai in Zulu-land, nagenoeg horizontaal op andere lagen liggend, aangetroffen. Het zijn zandige mergels, wier Ammonietenfauna op het Midden- en Boven-cretaceische tijdperk wijst. Eenige der belangrijkste publicaties over de fauna van deze lagen zijn die van Baily (53) en van Griesbach (6).

Tertiaire afzettingen.

Op Dunn's geologische kaart van Zuid-Afrika (57) worden op meer dan één plaats in de nabijheid van de kust tertiaire (marine) afzettingen aangegeven. Vooral in de Cape-flats en in de omgeving van Lorenzo Marques aan de Delagoa-baai hebben deze eene niet onaanzienlijke uitgebreidheid. Stow (50 p. 515) beschrijft deze afzettingen uit de omstreken van Port Elizabeth en noemt hen plioceen of postplioceen. Schenck (8) acht het niet onmogelijk, dat enkele van deze door hem als recent opgevatte afzettingen tot in het tertiare tijdperk kunnen terugreiken, doch hij is van oordeel, dat hun tertiair karakter niet bewezen is.

Recente afzettingen.

Alle onderzoekers van den bodem van Zuid-Afrika zijn het hierover eens, dat recente afzettingen bijna overal meestal tot op groote diepte de onderliggende gesteenten in Zuid-Afrika aan het oog onttrekken, hetgeen het geologisch onderzoek niet weinig bemoeielijkt. Deze recente vormingen bestaan waarschijnlijk wel in hoofdzaak uit op de plaats zelf gevormde of althans zeer weinig verplaatste verweeringsprodukten van het onderliggende vaste gesteente. Zulke vormingen worden wel eens onder den naam van el uviale vormingen saamgevat. Verder spelen lacustrine (in Zuid-Afrika wel bijna alle in brakwaterpannen gevormde) en aeolische (door de wind gevormde) afzettingen een groote rol. Hierbij komen nog de talrijke grindafzettingen uit oude of tijdelijke waterloopen. Een zeer groote uitbreiding en een aanzienlijke dikte verkrijgen hier en daar kalktuffen, wier ontstaan nog niet volledig verklaard is. S t o w heeft in zijne studie over Griqualand West (56) op de beteekenis dezer afzettingen gewezen en hij heeft aangetoond, hoezeer zij het onderzoek van het zoo

¹⁾ Uit de omgeving van de Algoa-basi werden deze reeds door Bain (3) als plioceea beschreven en op zijn kaart aangeduid.

interessante verband tusschen de vormingen van het Kaapplateau en die van het aangrenzende Karroo-bekken verzwaren.

Nog niet met zekerheid is tot nu toe uitgemaakt, of in Zuid-Afrika onder de recente vormingen ook glaciale afzettingen voorkomen.

Stow (50, pag. 534) is van oordeel, dat de denudatie van de Karroolagen in hoofdzaak aan de werking van ijs moet worden toegeschreven. Hij meent, dat na de vorming van de jongste Stormberg-lagen het Karroobekken steeds hoog en droog land is geweest en minstens tweemaal gletchers moet hebben gedragen. Aan de eerste ijsbedekking schrijft hij het ontstaan van het meestal ongelaagde Enon-conglomeraat toe, dat de basis van de Uitenhage-formatie vormt. Een jongere ijsbedekling, die wellicht in het diluviale tijdperk zou vallen, heeft volgens stow aanleiding gegeven tot het ontstaan van roches moutonnées, ketellalen (basin-like valleys), die door eindmoraines zijn afgesloten, zijmolaines en ongelaagde blokleemen, die hij op meer dan één plaats in het gebied der Storm- en Drakensbergen waarnam. Ook houdt Stow het diamanthoudende oude Vaalgrint of Vaalconglomeraat, dat veel onger is dan het door Dunn met Dwyka conglomeraat geparallelieerde Ancient conglomerate voor glaciaal.

Stocker (114) maakt melding van fraaie moraines in dalen in de abijheid van Champagne Castle.

Stapff (24) meent, dat in het diluviale tijdperk in Zuid-Afrika het limaat koeler en de neerslagen talrijker waren, waardoor de rivieren grooer transporteerend vermogen hadden en groote massa's grof grint konden fzetten. Om echter de aanwezigheid van gesteenten, wier herkomst niet ekend is, in de gronden, bijv. in het ancient conglomerate, in het eienveld en Boschjesmanland te verklaren en tevens voor het vinden an gekraste steenen en van krassen op de rotsen van den Campbelland in Griqualand-West eene uitlegging te geven, neemt hij aan, dat n het diluviale tijdperk het Karroobekken onder den zeespiegel lag en de trook land, waar nu het Dwyka-conglomeraat (Dunn) ligt, toen de nst van een golf uitmaakte 1). De ijsdrift van het Zuidpoolland strekte ch toen tot hier uit en ijsbergen brachten gesteenten (deels gekraste) uit et Zuiden aan en lieten ze bij afsmelting in de Karroobaai bezinken, rwijl zij bij het stranden den ondergrond ploegden en krassen op de otsen achterlieten. Voor deze hypothese is het noodig niveauveranderingen an minstens 1000 M. in recenten tijd voor Zuid-Afrika aan te nemen.

¹⁾ Stapff houdt het ancient conglomerate voor diluviaal en dus voor veel jonger an het Dwyka-conglomeraat in de Kaap-kolonie (verg. pag. 592).

Schenck (21) acht te recht een dergelijke niveauverandering volkomen onbewezen en onwaarschijnlijk. Ook gelooft hij, dat de talrijke keteldalen niet, zooals Stow meende, onder den invloed van gletschers zijn ontstaan; de dammen, die hen afsluiten, houdt hij niet voor eindmoraines, maar voor diabaas-banken, terwijl hij voor het ontstaan der roches moutonnées werking van wind en voor dat der blokleemen lokale verweering de waarschijnlijke oorzaak acht.

Hij komt tot de slotsom, dat men uit Stow's waarnemingen geenszins tot een diluviale gletscherbedekking in Zuid-Afrika mag besluiten.

Recente marine afzettingen komen in Zuid-Afrika slechts in de onmiddellijke nabijheid van de kust voor; zij bewijzen een negatieve strandverschuiving in geheel Zuid-Afrika van ongeveer 200 M. in het quaternaire tijdperk. Voor ons onderwerp zijn zij niet van onmiddellijk belang.

HOOFDSTUK II.

KORT OVERZICHT OVER DE BODEMGESTELDHEID VAN DE ZUID-AFRIKAANSCHE REPUBLIEK.

Terwijl wij ons in het vorige hoofdstuk, althans waar het Engelsch gebied gold, op de gegevens van bekende geologen en de resultaten van geregelde en jaren voortgezette onderzoekingen konden beroepen, moet men voor de Zuid-Afrikaansche Republiek geologische gegevens meestal uit de beschrijvingen van reisrouten van enkele geologen en geographen of uit de aanwijzingen van leeken putten. Wel zijn na de ontdekking der Transvaalsche goudvelden talrijke rapporten en ook schetskaarten over de bodemgesteldheid van de Republiek verschenen, doch hun betrouwbaarheid laat te wenschen over en schijnt wel eens in omgekeerde verhouding te staan tot de innerlijke belangstelling der opstellers in de finantieele resultaten der goudvelden.

A. ALGEMEENE OROGRAPHIE EN GEOLOGIE.

In het gebied der Transvaalsche Republiek kan men orographisch twee hoofdgebieden onderscheiden: 1) een in het algemeen west- en noordwestwaarts hellend plateau, kortweg hier het Transvaalsche plateauland genoemd, dat door een centrale O.-W. gerichte depressie (het eigenlijke Boschveld) in twee deelen, het Hoogeveld in het Zuiden en het Limpopo-plateau in het Noorden wordt gescheiden, en 2) de strook lager terrasland, die zich tusschen den steilen oostrand van het Transvaalsche plateau en de Lobombo-keten uitstrekt. —

Wel eens wordt de door langdurige erosie sterk verdeelde hooge oostzand van het Transvaalsche plateau als een afzonderlijk gebied met den zaam van Randgebergte behandeld, welke methode hier zal gevolgd worden 1).

Rehmann, die voor de orographie van de Zuid-Afrikaansche Resubliek de uitvoerigste gids is (23), onderscheidt twee zelfstandige hoogplateau's en twee laagvlakten. De eerste hoogvlakte omvat volgens hem et Hoogeveld en het terrasland tot aan de Lobombo-keten oostwaarts daarvan; het wordt door de laagvlakte van het Boschveld van de tweede oogvlakte, het Limpopo-plateau, gescheiden. De tweede laagvlakte boemt Rehmann het breede dal van de Limpopo, waardoor het Limpopoplateau ten Westen, Noorden en Oosten wordt omgeven (l. c. p. 259 en 260). Rehmann's indeeling is hier niet gevolgd. Mij schijnt het terrasland busschen het Randgebergte en de Lobombo-keten, zoowel ten Noorden als ten Zuiden van de Olifants-rivier, toe orographisch een geheel te formen. Het grootste gedeelte van dit terrasland ligt bovendien nog sooveel lager dan de laagste punten van het gebied bewesten het Randebergte (bijv. het Boschveld en de Limpopo beneden de watervalen), dat een tegenstelling van dit lagere terrasland tegenover ezamenlijke land bewesten het Randgebergte, het Transvaalsche lateauland, gerechtvaardigd schijnt. Zoo vond bijv. Cohen (10) de oogte van de ± 100 KM. breede strook van het terrasland tusschen et terras beoosten Lozie's kopje en den voet van de Lobombo-keten inemend van ongeveer 600-150 M., terwijl de hoogte van het Boscheld volgens Rehmann (23 p. 352) gemiddeld 900 M. bedraagt.

1. Het Randgebergte van de Transvaal.

Terwijl wij voor de algemeene eigenschappen van het Randgebergte van de op pag. 587 gemaakte opmerkingen omtrent het Randgebergte van det Karroo-bekken verwijzen, moet er toch op gelet worden, dat het Randgebergte in de Z. A. Republiek veel minder orographisch en geobegisch één geheel uitmaakt, dan zuidelijker in het Draken-gebergte det geval is. Terwijl hier het gebergte steeds de waterscheiding vormt usschen het westwaarts afwaterende Karroo-bekken en de kuststreek van Britsch-Kaffraria en Natal, welke water naar den Indischen Oceaan afvoert, speelt ginds in een groot deel van de Zuid-Afrikaansche Repu-

¹⁾ Het Gebroken- of Bankenveld (zie Blink 60) komt ongeveer overeen met een gebied, dat ons Randgebergte met de strook lager terrasland oostwaarts daarvan omvat.

bliek het Randgebergte als waterscheiding een meer ondergeschikte rol. Vooreerst is de waterscheiding overal breeder (men denke slechts aan de aan meeren en pannen rijke hoogvlakte van Wakkerstroom), voorts wordt het Randgebergte op meer dan één plaats door rivieren doorbroken, bijv. door de Komati-rivier en vooral door de Olifantsrivier, die nu een groot deel van het oorspronkelijk west- of noordwaarts afwaterende Transvaalsche plateau draineeren en door terugschrijdende erosie steeds meer in het stroomgebied van de Vaal en de Boven-Limpopo ingrijpen. Dit verschijnsel wordt wel bevorderd door het feit, dat de neerslagen op het Randgebergte in de Transvaal iets overvloediger zijn dan in de Oranje Vrijstaat, doch de grondoorzaak ligt hierin, dat het Randgebergte in de Transvaal geologisch niet één geheel, in de Oranje Vrijstaat wêl één geheel is. Terwijl in de Oranje Vrijstaat de hoogste kruinen van het Randgebergte steeds door diabaasplaten uit de Bovenste Karroo-lagen (Stormberg-beds) gevormd worden, is dit in de Transvaal alleen nog maar in het zuidelijk deel het geval. Toch vormen zelfs hier de Stormberg-beds nog maar een betrekkelijk dun laagje dat wigvormig op de daaronder liggende Kaapformatie uitloopt. Ook de diabaasplaten zijn in de Stormberg-beds van het distrikt Wakkerstroom veel minder samenhangend dan in het Randgebergte (het Drakengebergte) van de Oranje Vrijstaat, waardoor in dit distrikt het Randgebergte opgelost wordt in talrijke, door de erosie van elkaar gescheidene tafelbergen, de Verzamelbergen. Benoorden het distrikt Wakkerstroom schijnen lagen van de Karrooformatie zelve niet meer het hoofdbestanddeel van de hoogste gedeelten van het Randgebergte te vormen. Integendeel schijnen hier zandsteenen en diabazen uit de Kaapformatie (Cohen 10) in hoofdzaak het Randgebergte op te bouwen. De Kaapformatie is hier echter met O. W. strekking geplooid. Dus is benoorden het distrikt Wakkerstroom de steile oostrand van het Transvaalsche plateau nicts anders dan een door een (vroeger meer oostelijk gelegene) breuk (verschuiving) gevormde dwarsche doorsnede door een met O. W. strekking gevouwen gebergte, dat uit graniet en daarop rustende leien en zandsteen is opgebouwd 1). Geen wonder, dat toen de erosie dezen breukrand later westwaarts verschoof, hier meer aanleiding was tot het vormen van diep insnijdende en doorbrekende dalen (Olifantsrivier) dan bij den grooten breukrand van het Karroobekken. Nauwkeurige hoogtebepalingen in het Randgebergte van de Transvaal

1) Ten opzichte van het oostelijk gelegene lage land vormt het Transvaalsche plateauland dus een Faltenhorst.

zijn zeldzaam. Rehmann (23) schat de gemiddelde hoogte van de waterscheiding van het Randgebergte op 1650 M. en de gemiddelde hoogte der hoogste toppen op 2100--2300 M. Over het gedeelte van het Randgebergte ten Noorden van de Olifantsrivier en over de Zoutpansbergen is nog niet veel bekend; wel schijnt hier het Randgebergte nog eenigszins als waterscheiding, bijv. tusschen de Igalele- en de Letaba-rivier, te fungeeren (verg. Jeppe's Map of Transvaal 1889).

2. Het oostelijke lagere terrasland.

De strook laag land tusschen het Randgebergte en de Lobombo-keten is nog weinig bekend; zij schijnt te bestaan uit eenige terrassen, die een tot de Lobombo-keten zwak oostwaarts hellend terrein met het Randgebergte verbinden. In hoofdzaak bestaat dit terrein wel uit graniet (Cohen 10), doch bijv. in de omstreken van de Kaap Goldfields spelen behalve graniet leien uit de primaire formatie een belangrijke rol. In dit gebied zijn de terrassen overal door erosie ontstaan en hun optreden is telkens van de lokale geologische gesteldheid van den bodem afhankelijk.

Het merkwaardige Lobombo-gebergte beschreef C o h e n als eene door melaphyr begeleide reuzengang van kwartsporphyr, die door erosie is blootgelegd. De onderzoekingen der ingenieurs der Nederlandsche-Zuid-Afrikaansche Spoorwegmaatschappij hebben Cohen's waarnemingen bevestigd en aangetoond dat in de Lobombo-range melaphyren een groote rol spelen en door gangen van kwartsporphyr (gewoonlijk met N.-Z. strekking) worden doorbroken. Eén dezer gangen van kwartsporphyr in melaphyr geeft aanleiding tot het ontstaan van den Komati-waterval bij Komati-poort. De vraag, of deze groote gangmassa van eruptieve gesteenten die men in de richting van Noord naar Zuid over ongeveer 5 breedtegraden kan vervolgen, in verband staat met den vroegeren breukrand van het Transvaalsche plateau, kan eerst door later onderzoek worden beantwoord. Uit Cohen's (10) profielen zou men tot een antwoord in bevestigenden zin geneigd zijn.

3. Het Transvaalsche plateauland.

a. Het Hoogeveld. Het Hoogeveld, het best bekende deel van de geheele Zuid-Afrikaansche Republiek vormt een van Oost naar West langwerpig plateau, dat naar het Westen langzaam in hoogte afneemt. Het is aan de noordzijde door een steilen wand van het Boschveld gescheiden. De gemiddelde hoogte, welke in het Oosten ± 1600 M. bedraagt, vermindert naar het Westen allengs tot ± 1200 M. (westwaarts van

Potchesstroom). Het oostelijk deel van het Hoogeveld gaat onmerkbas in het Randgebergte en in de hoogvlakte van de Oranje Vrijstaat over Meer westwaarts vormt de Zuikerboschrand met de glooing van he diepe Vaaldal een natuurlijke zuidelijke grens van het Hoogeveld. Li het oostelijk deel van het Hoogeveld bestaat de bodem uit de hori zontale Stormberg-beds met hun diabaas-doorbrekingen; het schap met de talrijke spits- en kranskopjes 1) en tafel bergen komt hier geheel met dat van de Oranje-Vrijstaat overeen. De Stormberg-lagen loopen hier echter wigvormig tegen de lagen van de Kaapformatie uit, die het hoogste noorde lijke gedeelte van het Hoogeveld vormen en zuidwaarts onder de Stormberglagen wegschieten. Ongeveer bij Potchefstroom schijnt de west grens van de Stormberg-lagen getrokken te moeten worden. De Kaap formatie, welke overigens nagenoeg het geheele Hoogeveld vormt, bestaat uit leien, zandsteenen, kwartsieten en kristallijnen dolomitischen kalksteen Vooral laatstgenoemde holenrijke kalksteen (bekend is de grot en de onderaardsche loop van de Mooi Rivier bij Wondersontein), die me de kwartsieten en leien deels schijnt af te wisselen deels er op rus (Hubner 62, Mauch 63 en Rehmann 23), is over uitgestrekt asstanden het heerschende gesteente. Volgens Schenck (8), die dezer kristallijnen kalksteen tot de Kaapformatie rekent, stelt hij in het zuid westelijk deel van de Transvaal, met uitzondering van een smalle strool langs de Hart- en de Vaal-rivier, overal het Hoogeveld samen et staat hij in verband met de dolomitische kalksteenen van Britsch Bechuanaland en den Campbell-rand in Griqualand-West.

Het grondgebergte, graniet en kristallijne leien, schijnt in het Hooge veld slechts hier en daar, volgens Cohen (116 pag. 116) alleen in de diepste beekinsnijdingen, te voorschijn te komen. Ook op Schenck kaart (Plaat III) is in het Hoogeveld aan den graniet een zeer bescheiden plaatsje aangewezen in tegenstelling met Dunn (Pl. II), die kristallijne leien (Dunn's Namaqualand Schists) en silurische (?) afzettingen (Dunn's Lijdenburg beds), althans in het Witwatersrand-distrikt, een niet onbet langrijke rol laat spelen. In het Hoogeveld wordt de ligging der laget der Kaapformatie in hoofdzaak door eenige groote plooien met O—W strekking beheerscht; lokale storingen schijnen echter menigvuldig voor te komen.

¹⁾ Als type van een dergelijk kranskopje moge de in Lion Cachet's wed (64) afgebeelde Amajuba-Hill hier genoemd werden.

Coowel in den graniet en de kristallijne leien van het grondgebergte in de zandsteenen en den dolomitischen kalksteen van de Kaapformatie nen gangen en wellicht ook intrusieve banken van oud-eruptieve genten (granietporphyr, syenietporphyr, augiet-porphyriet in het grondgegte en gabbro, angietporphyriet, diabaas en syenietporphyr in de Kaapmatie) voor, welke door Dahms (116 p. 115) petrographisch beschrezijn.

Beneden Klerksdorp is over aanzienlijken afstand langs de Vaal tot n de vereeniging met de Hart-Rivier heldergroene diabaas- en melamandelsteen (Cohen's Vaalgesteenten) het heerschende gesteente. bbner (115) beschreef de groensteenbergen in de nabijheid van bron als een groensteenmassief en de gesteenten langs de Vaal van stroomopwaarts als groensteenbanken, die met dit massief in vernd staan. Moulle (1) beschouwt den melaphyramandelsteen langs de al als een bank, die uit de Karroo-lagen door denudatie is te voorlijn gekomen, welke dus overeenkomt met de talrijke diabaasbanken, in een hooger niveau concordant tusschen de lagen van de Stormbergmatie worden aangetroffen. Cohen daarentegen meent, dat de Vaalteenten veel ouder dan de Karroo-afzettingen zijn en in de Kaapfortie tehuis behooren. Op verschillende plaatsen is kwarts-porphyr r de Vaalgesteenten heengebroken. Van Klerksdorp aan de Schoonruit tot bij de Bamboesspruit vormt deze kwartsporphyr getsorde heuvels, welke nagenoeg evenwijdig met de Vaal in een NO.—ZW. bing verloopen en door Cohen over een afstand van 105 KM. nden gevolgd worden. Een gedeelte van deze heuvels van kwartsporphyr agt, zooals Hubner reeds vermeldde, den naam van Makwasiergen. Een uitvoerige petrographische beschrijving van de gesteenten de Makwasiebergen heeft Dahms (116 p. 108) gegeven, doch bner had (115 p. 82) reeds zeer juist de karakteristieke eigenschapn van dezen oligoklaasrijken kwartsporphyr opgemerkt.

De noordelijke steile rand van het Hoogeveld, waar langs men van t Hoogeveld naar het Boschveld kan afdalen, strekt zich met genoeg gelijkblijvend karakter van de Zwarte Ruggen ten Westen n Rustenburg in W.-O. richting tot voorbij Pretoria uit, is echter rder westwaarts slecht bekend; hij schijnt zich hier in verschilbde ruggen op te lossen, die ten slotte met het Randgebergte menhangen. Bijna overal is de noordrand van het Hoogeveld door rierinsnijdingen, die het water noordwaarts afvoeren, sterk ingesneden in een heuvelland veranderd. De deelen, die het meest weerstand

boden, werden ook hier het langst gespaard en zoodoende eindelijk geheel van den rand geïsoleerd. Op die wijze werd het heuvelland gevormd, dat nu den overgang vormt tusschen het plateau van het Hoogeveld en de veel lagere vlakte van het Boschveld. Vooral merkwaardig is de keten der Magalies-bergen, die vroeger met het Hoogeveld samenhing maar nu door een smal en diep dal van den eigenlijken rand, den Witwatersrand, is gescheiden.

Schenck meent, dat in het Hoogeveld de lagen van de Kaapformatie met W.-O. strekking in groote vouwen geplooid zijn en Magaliesbergen-Witwatersrand een geopend zadel, Witwatersrand-Zuikerboschrand een trog (Mulde) voorstelt. Neemt men Schenck's meening aan, dan laat zich ook ongedwongen het diepe erosiedal tusschen de Magalies bergen en den Witwatersrand verklaren. In het geopende zadel was immers de graniet, waarop de Kaapformatie rust, blootgelegd en was veel minder tegen erosie bestand dan de zandsteenen en kwartsieten van de Kaapformatie (de Magaliesbergen bestaan hoofdzakelijk uit witte kwartsiet Mauch (63 p. 11). Ook uit het profiel op Struben's geological map (70) kan men een ligging der gesteenten opmaken, die met Schenck's meening overeenkomt, doch dit profiel is onduidelijk en men kan de meening van den vervaardiger er niet voldoende uit lezen.

b. Het Boschveld. Met het Boschveld 1) wordt hier de groote vlakte bedoeld, die ten Zuiden door het Hoogeveld, ten Noorden door het Limpopo-plateau wordt begrensd (Rehmann). Het Boschveld i gemiddeld 900 M. hoog; de hoogte neemt van het Zuiden naar het Noorden 150-200 M. af. Ook is het Boschveld in het midden iets hooger dan oost- of westwaarts, waardoor het de waterscheiding tusschen de Olifants- en de Limpopo-rivier vormt. De eentoonigheid van deze vlakte wordt verbroken door talrijke, meest afgeknot kegelvormige hen veltjes (klippen), die uit graniet bestaan. Ook liggen de Pilaands bergen (1878 M.), die volgens Hubner (62) uit diabaas en porphy bestaan, gersoleerd op het westelijk deel van het Boschveld. Recente (eluviale) leemachtige verweeringsprodukten bedekken den bodem veelal tot 10 M. diep; het vaste gesteente daaronder is volgens Schenck (8) en Hubner (62) graniet, volgens Rehmann (23 p. 354), die alleen graniet aan de klippen waarnam, een in horizontale banken afgezet gesteente Een eenigszins afzonderlijke plaats neemt de Rustenburger vlakt

¹⁾ Wel eens wordt met Boschveld een veel grooter gebied, dat zich noordwaarts wellicht tot aan de Zambesi uitstrekt, bedoeld.

in 1), die ten Zuiden door de Magalies-bergen wordt begrensd en naar het Noorden en Noord-Oosten door de Pilaandsbergen en de Zwartkoppies van het Boschveld gescheiden is. De bodem van die vlakte bestaat uit bruine, ijzerrijke leem (Mauch), welke door Hübner als een verweeringsprodukt van groensteen wordt beschouwd.

Mauch noemde het gesteente der Zwartkoppies syeniet, Hübner groensteen. De onderzoekingen van Dahms (116) en Wülfing (117) aan door Cohen verzameld materiaal hebben bewezen, dat de Zwartkoppies in hoofdzaak uit gabbro met overgangen tot diabaas bestaan, doch dat lokaal nephelien-syeniet optreedt. Bewesten de Pilaandsbergen treedt weder graniet op, welke graniet volgens Hübner (62 p. 431) aan de Marico door kristallijne leien wordt bedekt. Kristalijne kalksteen schijnt hier ook weder eene groote rol te spelen (Schenck's kaart Pl. III).

c. Het Limpopo-plateau (Rehmann). Dit plateau bestaat uit tree, door den Nijlstroom gescheidene deelen, het westelijk deel, de Waterbergen, en het oostelijk deel, het Igalele-plateau met de Zout pansbergen. In het geheele Limpopo-plateau schijnen de gemeenten met W.-O. tot Z.W.—N.O. strekking geplooid te zijn, ten gevolge waarvan het geheele gebied uit eenige nagenoeg evenwijdige van Oost naar West verloopende bergreeksen bestaat, die alleen door hun gemenschappelijke verhouding ten opzichte van het Boschveld aan de the en de Limpopo-laagvlakte aan de andere zijde op den naam van oog plate au aanspraak kunnen maken. Van de Waterbergen is weibig bekend. De zandsteen en dolomiet van de Kaapformatie, wier opeden in den zuidelijken zoom van Buiskop tot Nijlstroom door Cohen 22 p. 113) werd bewezen, spelen hier weder een groote rol; waarchijnlijk hangen zij, door bemiddeling van de lagen in het Marico-distrikt, met de Kaapformatie van het Hoogeveld en de Kalahari samen. Iets meer weet men van het gedeelte van het Limopo-plateau ten Oosten van den Nijlstroom, het Igalele-plateau Rehmann. De zuidgrens van dit plateau wordt door de Makaans-bergen gevormd, die steil uit het Boschveld oprijzen. Het galele-plateau lost zich naar het Oosten op in een aantal, door diepe dalen scheidene, van West naar Oost verloopende bergruggen, die hoofdzakelijk uit gneis en kristallijne leien zijn opgebouwd, de Lechlababergen.

¹⁾ Door Rehmann wordt de Rustenburger vlakte tot het Limpopo-plateau gerekend, met welke opvatting ik mij niet kan vereenigen.

De hoogte van het Igalele-plateau neemt naar het Noorden toe en is het aanzienlijkst in het steile randgebergte, als een gedeelte van de Zoutpans-bergen bekend, dat de grens van het Igalele-plateau met de Limpopo-laagvlakte vormt. De gemiddelde hoogte van het Igalele-plateau is ± 1030 M., die van de Noordrand ± 1280. De hoogste toppen van de Makapans- en Lechlaba-bergen zijn zeker niet minder dan 1500 M. hoog. Schenck meent, dat het geheele Igalele-plateau uit Swasielagen (leien) wordt opgebouwd en dat alleen aan de zuidzijde in de Makapans-bergen en aan den noordrand in de Zoutpansbergen lagen van de Kaapformatie daarop rusten.

Ook Cohen is van oordeel dat de kern van het Igalele-plat e a u door een uitgestrekt gebied van kristallijne leien gevormd wordt, welke hij geneigd is voor palaeozotsch te houden. Als waarschijnlijk archaetsch beschouwt hij de gneis, die tusschen Eersteling en Venters farm optreedt. In den zuidelijken zoom, dus in de Makapans-bergen, worden de kristallijne leien discordant door zandsteenen (Kaapformatie) en hier en daar (tusschen de Nijlrivier en de Inkumpi) door dolomiet bedekt. Cohen houdt deze dolomiet voor identiek met die welke hij bij Lijdenburg (10 Kaart) in de Kaapformatie waarnam en met de bekende groote dolomietbedekking in het westelijk en zuidwestelijk deel van het Hoogeveld en in Griqualand-west. Er bestaat volgens de onderzoekingen van Götz (72) en Cohen een zeer groote verscheidenheid in de kristallijne leien van het Igalele-plateau. Genoemd werden chlolietlei, glimmerlei, gneisachtige lei, diorietlei, aktinolithlei, phylliet; ottrelithlei, andalusietlei, glimmerrijke kwartsiet, kwartstoermalijnlei, magnetietkwartsiet, serpentijn.

Een groote beteekenis hebben de zoogenaamde calico rocks, afwisselende lagen van kwartsiet en magnetiet of andere door chemische omzetting uit magnetiet ontstane ijzerertsen, welke tusschen de overige kristallijne leien hier en daar geheele bergen samenstellen, als bijv. den IJzerberg bij Eersteling.

Het noordelijkste deel van de Zuid-Afrikaansche Republiek wordt door den zoom lagen grond gevormd, die zich tusschen den rechteroever van de Limpopo en den noordrand van het Limpopo-platear uitstrekt. Baines en Mauch vonden op een paar plaatsen graniet in de Limpopo-beding. Deze streek is zeer onvoldoende bekend en schijnt zeer ongezond te zijn. Elton (119), die de Limpopo-rivier van den mond van de Schascha-rivier tot aan de watervallen van Tolo Azime afvoer, noemt graniet, syeniet en bazalt (met bazalt is

marschijnlijk diabaas bedoeld) als de gesteenten, waarin de rivier haar bed heeft gegraven.

Omtrent de recente vormingen in de Zuid-Afrikaansche Republiek geldt in het algemeen, wat reeds in Hoofdstuk I over de recente vormingen ran Zuid-Afrika is medegedeeld. Bizondere vermelding verdient echter de zoogenaamde veenbodem in de Zuid-Afrikaansche Republiek Roorda Smit's Hoog Veen 66, pag. 94), welke in werkelijkheid bechts uit elastische, humusrijke klei schijnt te bestaan. In het Boscheld schijnt dit veen? zeer verbreid te zijn. Schenck houdt het voor een betwaterbezinking in het inundatiegebied der rivieren van het Boschveld. Geter is het, dat een onderzoek van de recente vormingen in de Zuid-Afrikaansche Republiek voor de belangen van den landbouw van het pootste belang moet zijn.

Werpen wij ten slotte nog een blik op de algemeene hydrographische steldheid van de Zuid-Afrikaansche Republiek. De groote waterscheitusschen den Indischen en den Atlantischen Oceaan, die in de geheele mje-Vrijstaat in het Randgebergte ligt en zich door de Verzamelber-📭 in de Transvaal voortzet buigt zich daar, waar het Hooge eld met het Randgebergte samenhangt westwaarts , om van daar door het geheele Hoogeveld tot over de westgrens de Transvaal te verloopen. In de Transvaal zelve scheidt deze groote terscheiding (Rehmann 23, Anderson 9) het stroomgebied van Va al aan de ééne zijde van dat van de Limpopo, de Olintsrivier, de Komati en de Maputa aan de andere zijde. enwoordig speelt ten Noorden van het Hoogeveld het Transvaal-Randgebergte geen rol van beteekenis meer als waterscheiding, et de Olifantsrivier en enkele andere draineeren zoowel oost- als westarts van het Randgebergte een aanzienlijk gebied. De van het Transvaale plateau direkt naar den Indischen Oceaan stroomende rivieren, zooals Olifantsrivier, de Komati R., de Maputa R., de Pongola R. en andere, Litten een veel grooter verval en daardoor in hun bovenloop een veel groocrodeerend vermogen dan de rivieren, die naar den Atlantischen Oceaan, Mis de Vaal, water afvoeren of die eerst langs een grooten omweg, zooals Limpopo-rivier, den Indischen Oceaan bereiken. Dientengevolge zullen eersten ook steeds door terugschrijdende erosie meer en meer het stroom gebied der laatsten in grijpen en daarop rein veroveren. Hierdoor zal steeds minder water uit het regenrijkere, oostelijke deel van de Transvaal naar het regenarmere, westelijke deel (Dove 65) door de rivieren afstroomen. Eene nauwkeurigs studie van het ineengrijpen der stroomgebieden zal in de Zuid-Afrikaanscha Republiek voor iederen geoloog of geograaf een hoofdpunt van onder zoek moeten zijn. Zeker zal toch in de toekomst een stelsel var kunstmatige bevloeiing voor den landbouw in de Transvaa een levenskwestie worden; voor den doelmatige aanleg van zulk eer stelsel is natuurlijk nauwkeurige kennis van de uitgebreidheid en verdee ling der stroomgebieden (ook in verband met de talrijke slechts in der regentijd gevulde waterloopen) van het hoogste gewicht.

B. OVER GEOLOGISCHE KAARTEN VAN DE ZUID-AFRIKAANSCHE REPUBLIEK.

Gedetailleerde geologische kaarten van de Transvaal bestaan op ke oogenblik nog niet. Tusschen de verschillende overzichtskaarten bestat dikwijls groote tegenspraak en waarschijnlijk zijn slechts zeer weinig betrouwbaar. De kaart (66) van Roorda Smit is bijv. in lijnrechte strijd met de overige kaarten; op nagenoeg geen enkele plaats word hier voor een bepaald punt hetzelfde gesteente of dezelfde formatie aan gegeven, als op Schenck's (8) kaart. Waarschijnlijk is Roord Smit's kaart waardeloos. H. Haevernick's (68) kaart is een proeve om de verspreide geologische waarnemingen van Mauch (63), Cohe (10), Griesbach, Baines (69), Hubner en anderen in kaart bijeen te brengen; voor volgende onderzoekers zal deze kas zonder twijfel van eenige waarde zijn, doch het is niet mogelijk zie daaruit een beeld van den geologischen bouw van het land te scheppe Moulle's kaart (1) en zijne profielen geven een duidelijk beeld w de denkbeelden, die deze schrijver omtrent de geologische gesteldhe van de Transvaal heeft (verg. Fig. 1). Hij meent, dat hetzelfde groa gebergte van graniet en gneis, dat in het Zuid-Afrikaansche kustgeberg o. a. bij de Kaapstad voor den dag komt, zich onder het Karroo-be ken en ook onder de Transvaal voortzet en bijv. in het Boschveld, l Lijdenburg en langs de Limpopo voor den dag komt. Hij meent, d op dit grondgesteente dikke schollen van silurische, devonische en a bonische gesteenten (Schenck's primaire en Kaapformatie) rusten, wel hij op zijn kaart niet van elkaar scheidt. In het Zuiden van de Tru vaal rusten lagen van de Karrooformatie discordant op den graniet gneis en op Moulle's oude sedimentaire formatie. Moulle maakt 0

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ASTOR, LENOX AND TILDEN FOUNDATIONS:

Tijdschrift van het K.F **GEOLOGISCHE** NAAR DU Topographisc naar Jeppe's Lith . P.J.Milder Leiden V. Tertisire formatie Tertivir (Cape Flats S

CISCHE Consumer van

de melaphyren langs loop van de Vaal.

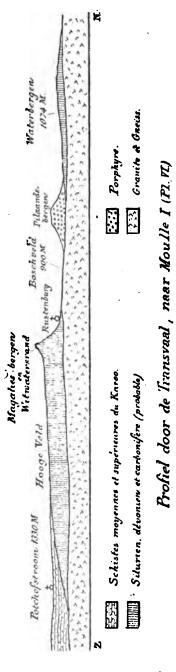
AAR DI

aphisc

Jeppe

s geologische kaart (70), geologisch gekleurd is, alleen hier en daar de voorkomende gesteenten sijn, heeft als overzichtswaarde.

meer belang zijn de geohetskaarten van Dunn n Schenck (8), resp. n in 1888 gepubliceerd. e kaarten zijn hier op Pl. I weergegeven. Het groote topographischen grondslag leze beide kaarten maakt vergelijking zeer moeielijk. eden zijn hier in Pl. II en eide tot denzelfden topoen grondslag, ontleend aan kaart van 1889, herleid. ierdoor (vooral bij Dunn's ie zonder tekst verschenen een zeer onvoldoenden topohen grondslag berust) in de onnauwkeurigheden kunnen reslopen en hier en daar welde opvattingen der ontwerpers olkomen juist zijn weergegeven, rentegen het groote voordeel gen de algemeene opvatting Dunn met één oogopslag met an Schenck te kunnen ver. en; dit nu is van belang, omdeze beide kaarten van de Zuidaansche Republiek de eenigen aan welke eenige autoriteit mag **e**n toegekend. Op de beide kaarzijn de overeenkomstige formamet gelijke kleur aangegeven.



Schenck meent, dat de Zuid-Afrikaansche primair-formatie in de Zuid-Afrikaansche Republiek wordt vertegenwoordigd dog een groot granietmassief, dat bijv. in het geheele Boschveld en in be oostelijke terrasland tusschen de Komatien de Olifants-nivier voor de dag komt, en door een daarop rustende formatie van kristallijne leien de Swasielagen. Deze laatsten zijn met O.-W. strekking gevouwe en stellen een groot deel van het Limpopo-plateau samen (zie Pl. III] terwijl zij bovendien in het oostelijke terrasland bij Barberton en in Swisieland eene groote beteekenis erlangen.

Bij Dunn speelt in de primaire formatie gneis, welk gesteent niet door Schenck uit de Zuid-Afrikaansche Republiek wordt vermeld een groote rol, vooreerst in het deel van de Limpopo-rivier tot aan d Zoutpansbergen en verder in een groot dal van het Boschveld en Magalele-plateau. Graniet vormt volgens Dunn bijna het geheele oostelijk terrasland en het westelijk deel van het Boschveld. De kristallijne leie (Dunn's Namaqualand Schists) nemen in verhouding tot gneis en graniet op Dunn's kaart slechts een bescheiden ruimte in.

Een zeer belangrijk verschil in opvatting met Schenck is, dat volgen Dunn in het Hoogeveld de primaire formatie (graniet en leien) in twe evenwijdige van West naar Oost gerichte stroken van onder de lagen de Kaap-formatie voor den dag komt, terwijl Schenck in het Hoogeveld slechts op één plaats graniet teekent. Uit Dunn's kaart mag me opmaken, dat ook volgens zijne opvatting de lagen van de primaire sq matie met O.-W. strekking geplooid zijn; vooral mag men dit besluite uit de richting der stroken van de Namaqualand Schists op den granie in het gebied van de Letaba-Rivier en uit de wijze waarop de primair sormatie in het Hoogeveld voor den dag komt.

Discordant tegen de primaire formatie liggen groote schollen van zant steen, lei en dolomiet van de Kaap-formatie. Volgens Schenck heerscheze formatie in de Waterbergen, de Makapansbergen, het noordelij deel van de Zoutpansbergen, het grootste gedeelte van het Randgebergt bezuiden de Olifants-rivier, een groot deel van het Hoogeveld en ee deel van het Marico-distrikt; op Schenck's kaart wordt het geheele granietmassief van het Boschveld door de Kaap-formatie ingesloten. Kritallijne dolomitische kalksteen is in deze formatie het toongevende gesteente in het westelijk deel van het Hoogeveld, doch het komt ook in het Randgebergte en bij Makapan's poort voor. Bovendien onderscheid Schenck in deze formatie een zandsteen- en een lei-zandsteen-faciet welke verdeeling op Pl. III niet is weergegeven.

De Dunn's kaart wordt deze formatie door de volgens Dunn Siluri-Lijdenburg Beds voorgesteld. Opvallend is, dat Dunn in de Waergen deze formatie niet aangeeft.

Terwijl nu bij Schenck in ouderdom op de Kaapformatie afzettinnit de Karroo-formatie volgen, vinden wij bij Dunn nog de Carboterous sandstones (aequivalent met den Zuurberg-zandsteen in de
hap-kolonie). Deze formatie wordt volgens Dunn in het noordwestelijke
westelijke gedeelte van het Limpopo-plateau gevonden en stelt ook
n noordrand van het Hoogeveld tusschen Pretoria en Middelburg san. Dit verschil in opvatting tusschen Dunn en Schenck is minder
tot dan het lijkt, omdat door Schenck in de Kaapkolonie zelve ook
Witteberg en de Zuurberg zandsteen en kwartsiet in de Kaapformatie
uden gebracht en met den Tafelberg-zandsteen (zandsteen-facies van de
hapformatie) worden vereenigd. Een groot deel van Dunn's "Carbonifeis Sandstone" in de Z. A. Republiek valt inderdaad samen met zandenfacies van de Kaapformatie op Schenck's kaart.

De onderste lagen van de Karroo-formatie, de Ecca-lagen (de onderg van de Ecca-lagen is het bekende Dwyka-conglomeraat) komen vols Schenck binnen de grenzen van de Zuid-Afrikaansche Republiek ten voor in de distrikten Vrijheid, Utrecht en Piet Retief, als de teste punt van den grooten bijna geheel gesloten zoom, die den buitend van het Karroobekken vormt. Aan den anderen kant begint deze zoom bij Kroonstad en beslaat van hier bijna de geheele westelijke helft de Oranje-Vrijstaat. Op Pl. II en III kan men de Eccalagen tot Kimley vervolgen.

Dunn geeft bovendien in de Blauwbergen aan den noordrand van het impopo-plateau Dwyka-conglomeraat aan.

In het zuidelijk deel van de Zuid-Afrikaansche Republiek grijpen de mberg-lagen over de andere afzettingen van het Karroobekken heen liggen daardoor discordant op de Kaapformatie. Dunn geeft zoowel in het Westen als naar het Oosten aan de Stormberg-lagen eene grootere breiding dan Schenck; de Ecca-lagen van Schenck in het Zuid-Oosten de Z. A. Republiek rekent Dunn in hun geheel tot de Stormberg-en.

Endelijk noemt Dunn onder de sedimentaire afzettingen in de Z.-A. publiek nog tertiair, aequivalent met de Cape Flats Sandstone de Kaapstad; deze formatie zou volgens hem aan de Inkumpi of Komskiv. bezuiden Maraba's stad voorkomen. Bij geen anderen schrijver ondt van tertiaire afzettingen in de Z. A. Republiek gewag gemaakt en

het mag in verband met den algemeenen geologischen bouw van Zu Afrika voor hoogst onwaarschijnlijk gehouden worden, dat tertiair h zoo hoog (900 M.) boven de oppervlakte van de zee zou gevond worden.

Met een roode kleur zijn op Schenck's kaart (Pl. III) aangegeven diabazen en melaphyren in het Vaalgebied en de groote diabaasbankt die in de Stormberg-lagen een groote uitbreiding erlangen. Door Schen worden deze gesteenten saamgevat onder den naam van "groensteen van verschillenden ouderdom".

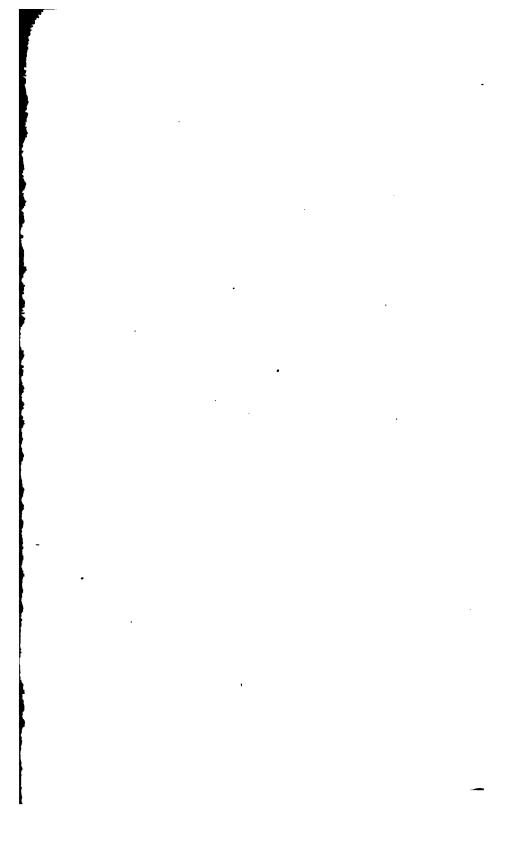
Met dezelfde kleur zijn op Dunn's kaart aangeduid gesteenten, in hij samenvat onder den naam van "Diabaas etc. jonger dan de Lijde burg Beds." Hiertoe behooren de bovengenoemde eruptieve gesteent in het Vaalgebied, terwijl zij verder in de Pilaandsbergen, de Loboml keten en op eenige plaatsen om het Boschveld bij Middelburg, Nijlstroe etc. aangegeven worden.

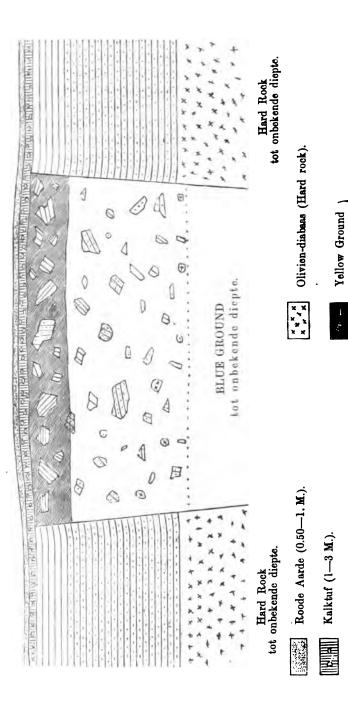
Als het heerschende gesteente in de Pilaandsbergen en in de Loboml keten wordt door Schenck porphyr genoemd. Op Dunn's kaart I slaan bovendien nog een vrij groote ruimte eruptieve gesteenten, die onder den naam van "intrusieve Dioriet, Syeniet, etc. onder één kk vereenigt. Op zijn kaart vinden wij deze gesteenten in het Witwatersrai distrikt ten Westen van Johannesburg, in de Rustenburger vlakte, Maraba's stad en in het oostelijk gedeelte van het Boschveld ten No den van Middelburg.

Eene nauwkeurige vergelijking van Pl. II en III in verband met hetge in het vorige hoofdstuk reeds omtrent de geologische gesteldheid v de Zuid-Afrikaansche Republiek is medegedeeld, zal zonder twijfel de gevolgtrekking leiden, dat zelfs omtrent de grondbeginselen van kennis der geologische gesteldheid van dit land bij de meest v trouwbare onderzoekers groote onzekerheid heerscht, zoodat het wel n een stout beweren kan genoemd worden, dat in de Zuid-Afrikaansc Republiek, wat de geologische wetenschap betreft, nog nagenoeg al te doen is.

C. DELFSTOFFEN IN DE ZUID-AFRIKAANSCHE REPUBLIEK.

Omdat in den laatsten tijd de ontginning van verschillende delfstofi in de Transvaal een zeer groot nationaal belang geworden is, zij h in ruwe trekken geschilderd, wat omtrent de verschillende delfstoffe die gegraven worden, uit een geologisch oogpunt bekend is.





Diepte, tot waar ongevoor in 1885 de open uitdel-

vino peanshand ens

:::::

Blue Ground

80

Hardere, donkere lei (black shale) ± 68 M.

i

Geelachtige lei (yellow shale) ±15 M.

met "floating reef".

I. Diamant 1).

n onderscheidt in Zuid-Afrika twee soorten van diamantmijnen, de iggings en de river-diggings. Alleen de laatsten liggen gedeeltelijk n het gebied van de Zuid-Afrikaansche Republiek.

t diamant-houdende gesteente van de dry-diggings vormt smalle, echte pijpen of trechters van onbekende diepte in een nevengete, dat tot de onderste Karroolagen (Kimberley-shales) wordt gere. De ligging van de lagen in dit nevengesteente is ongestoord en noeg horizontaal, alleen dicht bij en rondom de diamanthoudende n iets opwaarts gebogen (Fig. 2). Dit nevengesteente, het zoogede reef bestond tot op een diepte van ± 15 M. uit lichtgekleurde, de yellow shales en dieper uit donkere koolrijke leien, de black s, onder welke op een totale diepte van ± 85 M. een bank van ien-diabaas (volgens Cohen) volgde, waarvan de dikte nog niet beis, doch minstens 70 M. bedraagt. Diamanten vindt men in dit nimmer. Fabelachtig rijk aan diamanten is daarentegen de diamantende grond, die de diamant pij pen vult.

e omvang dezer diamantpijpen is gering, de Kimberley-mine is M. lang en 187 M. breed, de anderen zijn voor 't meerendeel iets ter. Het aantal is gering en er schijnen in het geheel slechts een tal te bestaan, die met voordeel bewerkt worden.

iezen wij als voorbeeld voor den bouw van deze diamantpijpen de mvolging der grondsoorten, die men in de Kimberley-mijn tot nu toe t aangetroffen (verg. fig. 2). Boven op het vroegere heuveltje, juist en den diamantpijp (Colesberg-kopje) lag ongeveer 1—2 M. dik een de aarde, een aeolisch produkt, dat ook overal elders in de vlakten te omstreken van Kimberley in Griqualand-West en den Oranje-Vrijstaat ovenste laag van den bodem vormt. Onder deze roode aarde volgde M. een gesteente, dat uit dichten kalksteen bestaat, waarin stukken velerlei andere steensoorten zijn ingesloten, en kalktuf genoemd it. Deze kalktuf is evenmin in zijn voorkomen tot de diamantpijpen rkt, maar bedekte evenals de roode aarde voor de ontginning zoo-

Wat de litteratuur over het voorkomen der diamanten in Zuid-Afrika betreft, zij op enkele verhandelingen gewezen, die meer uitsluitend hierover handelen, nl. die Cohen (17a en 81), Moulle (1), Chaper (73), Jacobs et Chatrian Dunn (75, 76), Gilfillan (77), Shaw (78), Stow (79), Todd (80), Bou-1(20).

wel het gesteente van het reef als van den diamantpijp. Hieronder vol het eigenlijke diamanthoudende gesteente, de yellow en de blu ground.

De blue ground zelve is een olivien- en serpentijnrijke tufachtige bre cie, welke zeer aan vulkanische tuf herinnert. Zij bevat behalve diama min of meer afgeronde fragmenten van verschillende mineralen en g steenten. Bovendien komen in den diamanthoudenden grond talrijl brokstukken van het nevengesteente, "floating reef", voor, welke ed ter, naarmate men met de exploitatie dieper vordert, kleiner en gering in aantal worden. Tot op een diepte van ± 21 M. is deze blue groun door atmospherische invloeden tot een talkrijke massa, de yellow groun ontleed. Cohen (174) houdt deze diamantpijpen voor oude kraterpijpen e het diamanthoudende gesteente voor een vulkanische tuf, eene meening welke door vele geologen wordt gedeeld. Onder de hiervan afwijkend opinies verdient wel het meest de aandacht die van Stanislas Mei nier (105 en 107), welke den diamanthoudenden grond in de diaman pijpen voor eene afzetting uit opstijgende, warme bronnen, dus voor et vertikaal alluvium houdt. Deze meening houdt rekening met b talrijk voorkomen van geheel afgeronde fragmenten van mineralen en g steenten in den diamantbodem. Andere hypothesen (Boutan 120, Da brée 106 en 123) houden min of meer het midden tusschen de beide g noemde theoriën en zien in den diamanthoudenden grond een vulkanise materiaal, dat uit zeer groote diepte (les régions, où domine le péride Daubrée) afkomstig is en met veel water gemengd als een vulkanis slijk bij relatief lage temperatuur is opgestegen. Hetzij men nu wil aa nemen, dat opstijgende bronnen den diamanthoudenden grond hebbi aangevoerd of dat men de voorkeur geeft aan de onderstelling, dat (diamantpijpen eenmaal de haarden van vulkanische uitbarstingen warei in ieder geval lijdt het geen twijfel, dat het diamantgesteente van b neden naar boven is opgestegen en dat een spleet (breuklijn) in de aan schors aan de "blue ground" gelegenheid heeft moeten geven op me dan één plaats de oppervlakte der aarde te bereiken.

Met deze onderstelling is de ligging der tot nu toe bekende diaman mijnen in Zuid-Afrika in volmaakte overeenstemming. In Fig. 3 is c ligging der voornaamste mijnen aangegeven 1). Alle tot nu toe bekend diamantmijnen liggen op een rechte lijn, (SS' op Fig. 3), welke me

¹⁾ De topographische grondslag van dit kaartje is aan "Jeppe's Map of the S.-Republic" van 1889 ontleend.



- Steden en Dorpen.
- Politieke grenzen.
- Diamantmijnen (dry-diggings).

River-diggings.

Schaal 1:1.900.000.

- 1. Kimberley-mijn.
- 2. Old de Beer's mijn.
- 3. Bultfontein.
- 4. du Toit's pan.

an Jagerssontein over Kimberley in Z.O.—N.W. richting tot aan de Hart-Rivier kan vervolgen. Deze groote spleet is in de nabijheid van het voornaamste centrum, Kimberley, verdubbeld, waar de vier rijkste diamantmijnen Kimberley, Old de Beer's, Du Toit'span en Bultfontein twee evenwijdige lijnen aangetroffen worden. In het Kimberley mijntentrum schijnt de hoofdspleet enkele dwarsspleten te bezitten, waarop tenige meerendeels niet zeer productieve diamantmijnen gevonden zijn, socals Otto's Kopje, Spijtfontein etc.

In den laatsten tijd zijn eenige nieuwe mijnen ontdekt, welke ook op deze spleet gelegen zijn en de verwachting ligt voor de hand, dat bij stelselmatig onderzoek van het terrein langs de lijn SS¹ nog meer diamantpijpen zullen gevonden worden.

De river-diggings komen in oude grindafzettingen voor, die aan weerszijden van de Vaal dikke en uitgestrekte banken vormen. Dit oude Vaalgrind bleek vooral rijk aan diamanten te zijn boven de inmonding van de Hart Rivier in de Vaal Rivier, bij Hebron, Klipdrift en vandaar stroomafwaarts. Even boven Klipdrift is nu juist het punt, waar de lijn S S' (Fig. 3), de Vaalrivier snijdt. Wellicht zijn dus de diamanten van deze river-diggings oorspronkelijk uit de diamantpijpen welke in de nabijheid op de lijn SS' gelegen zijn, afkomstig. Volgens Cohen (172) zijn de diamanten van de river-diggings alle uit zulke pijpen als die van Kimberley afkomstig, welke door erosie en denudatie geheel of gedeeltelijk vernield werden, waarna de diamanten in de waterloopen achterbleven. In dit geval is de herkomst van diamanten der river-diggings oorspronkelijk in dry-diggings te zoeken. Neemt men deze meening aan, dan wordt het een zaak van het grootste gewicht, de herkomst te bepalen van de diamanten, die in de river-diggings bij Bloemhof en elders aan de Vaal gevonden zijn. Deze diamond-gravels liggen in het Vaal-bed 100 kilometer en meer stroomopwaarts van Klipdrift; zij kunnen dus onmogelijk uit de diamantpijpen van het Kimberley distrikt afkomstig zijn. De mogelijkheid bestaat echter, dat deze vindplaatsen van diamanten langs de Vaal boven Bloemhof zich tot een nog niet ontdekte spleet met diamantpijpen op dezelfde wijze zullen verhouden als de river-diggings van Hebron, Pniel en Klipdrift (= Barkly) zich tot de bekende spleet S S' verhouden 1). Een nauwkeurig en gedetailleerd onderzoek van de omgeving van deze river-diggings aan weerszijden van de Vaal zou daarom van zeer groot belang zijn. Mocht het gelukken ook hier der gelijke diamantpijpen te ontdekken, dan zou dit niet alleen wetenschappelijk maar ook oeconomisch een hoogst belangrijk resultaat zijn.

2. Goud.

Zagen wij, dat bij de diamantontginning tegenwoordig de belangen der Zuid-Afrikaansche Republiek slechts even gemoeid zijn, het leeuwendeel in de goudontginningen in Zuid-Afrika komt aan de Transvaal toe ²).

¹⁾ Eenige waarschijnlijkheid verkrijgt deze hypothese bijv. door het feit, dat volgens Hübner (115 p. 214) aan de Kl. Vet Rivier ook diamanten zijn gevonden.

²⁾ De litteratuur over de Transvaalsche goudvelden is reeds vrij aanzienlijk en neemt met den dag toe; behalve tallooze populaire geschriftjes zij hier gewezen op de publicaties van Cohen (10, 71, 82, 122), Penning (61), Baines (69), Jeppe (67, 83, 85), Emmrich (84), Glanville (86), Schenck (121).

Men kan de volgende goudvelden onderscheiden:

De Kaap-, Komatie- en Swasieland-goudvelden.

De Lijdenburg-goudvelden.

De Witwatersrand- en Klerksdorps-goudvelden.

De Malmani-goudvelden.

In de Kaap-, Komati- en Swasieland-goudvelden is, zooals trouwens in de geheele Z.-A.-Republiek, alluviaal goud schaarsch; te riffen (bekend is o. a. het rijke Sheba-rif 99), waaruit het goud door mijnbouw wordt verkregen, zijn kwartsgangen, die bijna alle met O-W strekking in de lagen van de primaire formatie (Swasielagen) optreden. De goudhoudende kwartsgangen schijnen met de groensteengangen en banken, die in de Swasielagen voorkomen, in verband te staan.

Het voorkomen van goud bij Marabastad, bij Eersteling en in de Zoutpansbergen schijnt met het voorkomen in de Kaapgoudvelden volkomen overeen te stemmen. Bij de Lijdenburger goudvelden komt het goud volgens Schenck (8) voor in de tot lateriet ontleede diabaasbanken uit de leien en zandsteenen van de Kaap-formatie en ook in kwartsgangen, die het rijkst zijn, waar zij de diabaasbanken doorbreken. Er wordt echter ook tamelijk veel alluviaal goud gewonnen. Hoe het goud in de Murchison-Range voorkomt, schijnt nog niet bekend gemaakt te zijn.

Op de Malmani-goudvelden wordt het goud uit kwartsgangen gewonnen, die in den dolomitischen kalksteen, die tot de bovenste afdeeling van de Kaap-formatie gerekend wordt, voorkomen.

Zeer eigenaardig is het voorkomen van het goud in het Witwaterszand-distrikt. Het komt hier nu eens meer, dan eens minder fijn
verdeeld in een conglomeraat voor, dat uit door zand en kiezelzuur
verbonden kwartsgrind bestaat (banket); de conglomeraat-lagen wisselen
met zandsteen en groensteenbanken af, welke gezamenlijk tot de Kaapformatie gebracht worden. Van groot belang zou het zijn den aard en de
vijze van ontstaan van dit eenigszins raadselachtige conglomeraat te kunmen vaststellen. Schenck meent, dat het ontstaan is uit de goudhoudende kwartsgangen van de er onder liggende primaire formatie, welke
door de branding der zee, waarin later de lagen der Kaap-formatie werden
stigezet, werden vernield gedurende een tijdperk van positieve strandverschuiving, waarbij de kustlijn geleidelijk naar het binnenland werd verschoven. De overblijfsels van deze goudhoudende kwartsgangen werden
stoen in die zee weder afgezet als het bekende conglomeraat (banket) van
stigeronde kwartskiezels door een sterk goudhoudend cement verbonden.

De Witwaterrandsgoudvelden verkrijgen een steeds hoogere beteekenis, wat vooral moet worden toegeschreven aan de groote uitgebreidheid, en het tamelijk gelijkblijvend goudgehalte der conglomeraatlagen. De exploitatie heeft geleerd, dat de ligging der lagen een trogvormige is; de opstijgende randen van den conglomeraat-trog worden in het Noorden langs den Witwatersrand, in het Zuiden bij Klerksdorp en langs den Zuikerboschrand, en in het Oosten bij Heidelberg geëxploiteerd, terwijl het westelijk deel door dolomitischen kalksteen van de Kaap-formatie en het oostelijk deel hier en daar door koolhoudende lagen der Stormberg-formatie is bedekt en aan het oog onttrokken. Schenck (121) is van oordeel, dat de conglomeraatlagen van den Zuikerboschrand en van Heidelberg, welke allen met O.—W. strekking naar het Noorden hellen, beide tot den zuidvleugel van den trog behooren, doch door een langs de zuidzijde van den Heidelbergerrand verloopende breuklijn ten opzichte van elkaar zijn verschoven

De meeste algemeene kaarten, die van de Transvaalsche goudvelden zijn verschenen, zooals die van Wyld (93, 97), Stanford (96) en Glanville (86) bepalen zich tot het aangeven van enkele, steeds zoo groot mogelijk genomene, algemeene omtrekken van de goudvelden, die als meer of minder groote, geel gekleurde ovalen, blokken of strepen op de kaarten verschijnen.

Vele andere kaarten van bepaalde gouddistrikten geven bovendien de grenzen der "farms" die tot dat distrikt behooren (zooals bijv. de kaarten van Kelsey Loveday (89), Troye (94), Wyld (98) en Raddatz (90), vergezeld van meer of minder uitvoerige terreinteekeningen); nog andere zooals die van Liddell (99), Erskine (92), Smith (95) en Troye (91) leveren bovendien interessante bizonderheden omtrent het verloop der goudhoudende gangen (riffen).

Struben's geological map (70) tracht meer te geven. Struben vereenigt alle bekende goudvelden door een breeden gekleurden band en noemt dezen "supposed continuation of the gold-bearing belt." Het behoeft wel geen betoog, dat aan deze constructie alle wetenschappelijke waarde moet worden ontzegd. Wel zou het voor de Zuid-Afrikaansche Republiek van het grootste belang zijn, wanneer men de grenzen van de formaties, in welke goud te verwachten is, nauwkeurig kende, doch eerst een nauwgezet geologisch onderzoek kan hier zekerheid geven.

3. Kool.

Van niet minder belang dan de gouddelving mag voor de Zuid-Afri-

tenkolen zijn in de Transvaal aan de Stormberg-lagen gebonden, die zooals we zagen in het Zuid-Oosten van de Republiek wigvordig op de er onder liggende Kaapformatie uitloopen. Bijna overal, waar deze Stormberg-lagen onderzocht zijn, heeft men ook steenkool gevonden. Zelfs in het Witwatersrand-distrikt, waar de Stormberg-lagen slechts als zelsoleerde plekjes hier en daar op de banket-formatie rusten, en slechts een geringe dikte bezitten, worden er toch ontginbare steen kolen beddingen in aangetroffen. Zoo worden op het oogenblik door de Zuid-Afrikaansche Spoorwegmaatschappij te Boksburg aan het eindpunt van den tramweg Johannesburg-Boksburg in de Stormberg-lagen twee steenkolenbeddingen van resp. ± 5 en 8 M. dikte ontgonnen. Twee, zoowel wetenschappelijk als practisch, belangrijke vraagpunten wachten hier oplossing.

- a. Hoever strekken zich de Stormberg-lagen uit? In het Westen schijzen deze lagen niet noordelijker dan de lijn Bloemhof—Potchefstroom—Pretoria voor te komen, doch bij het Randgebergte is hun noordgrens nog niet bekend 1). Door Mauch is echter veel noordelijker bij de Letaba-rivier in het distrikt Zoutpansberg ook kool gevonden, terwijl ook noordelijker dan de Limpopo Karroo-lagen met koolbeddingen bekend zijn (verg. Gürich 100). Behooren deze verspreide koolformaties wellicht alle tot één formatie?
- b. Behooren de koolbeddingen, die op verschillende punten in de Transvaal gevonden of ontgonnen worden, tot één niveau en is het waarschijnlijk, dat zij als deelen van ééne, groote doorloopende steenkolenbedding moeten worden opgevat?

Moulle (1) en Penning (46) achten dit waarschijnlijk, terwijl daarentegen Green (7, 45) meent, dat alle ontgonnen steenkolenbeddingen in de Zuid-Afrikaansche Republiek, de Oranje-Vrijstaat en Natal slechts lokale vormingen zijn. Moulle en Penning leggen er vooral gewicht op, dat bijna overal de koolbeddingen op dezelfde hoogte worden aangetroffen, dat zij voorts in het algemeen in het Westen iets lager voor den dag komen (Vaal-rivier 1330 M.) dan in het Oosten (Randgebergte 1630 M.) en dat dit verschil uitstekend overeenkomt met de algemeene, zeer zwakke helling der Stormberg-lagen naar het Westen. Mocht het blijken, dat alle tot nu toe lokaal

¹⁾ De door Penning (46) gegeven schets van de uitbreiding der Stormberg-lagen in de Transvaal is zonder twijfel juister dan de door Schenck gegevene (8).

geexploiteerde koolbeddingen in de Transvaal dee en van ééne doorloopende koolbedding uit maken of althans tot éénzelfde, aan lokale koolbeddingen, rij niveau behooren, dan zou dit resultaat voor de welvaart van d Zuid-Afrikaansche Republiek zeer belangrijk mogen genoemd worden.

Bij den geringen houtrijkdom van de Transvaal zal immers het we slagen van de meeste industriën en voor een groot deel ook van de mijnbouw van het aanwezig zijn van groote voorraden steenkool in he land zelf min of meer afhankelijk moeten worden. Nauwkeurige hoogte metingen en petrographische en stratigraphische studies in de Stormberg lagen kunnen in deze vraag veel tot beslissing bijdragen.

Behalve kool, diamant en goud worden in de Zuid-Afrikaansche Re publiek nog vele andere delfstoffen, zooals zilver- en koperert! niet ver van Pretoria, kobalterts nabij Middelburg, looderts is het Marico-distrikt enz. gevonden of ook wel gewonnen. IJ zererts schijnt in de Zuid-Afrikaansche Republiek zeer overvloedig te zijn. Mauch (63) vermeldt een laag magneetijzererts, welke op een half uur afstands ten Noorden van den Magaliesbergketen met O.-W. strekking van Pretoria tot dicht bij Rustenburg kan gevolgd worden. Uit Mauch's beschrijving is niet goed op te maken tot welke formatie deze ertsbedding be hoort. Cohen (71 en 72) maakt melding van de uitgebreide en dikke ijzerertslagen in de lei-formatie (Swasielagen) bij Maraba's Stad (verg. pag. 19). Op Struben's kaart vindt men van de meeste ertsen eenige vindplaatsen aangegeven. Statistische gegevens omtrent den mijnbouw in de Transvaal kan men o. a. putten uit de jaarboeken van Noble 103, Jeppe 102, uit the "Argus" Annual (101) en uit Aubert's (104) naar aanleiding der Parijsche Tentoonstelling geschreven overzicht.

Bij het oorspronkelijke rapport was een hoofdstuk over de samenstelling en de wijze van werken der voorgenomen expeditie gevoegd, waaruit enkele conclusies zijn vermeld in het Jaarverslag van het Aardrijkskundig Genootschap over 1889, dat in 1890 verschenen is.

Amsterdam, Januari 1890.

BIJLAGE A.

IJST der geciteerde werken, die voor de kennis van de geologische gesteldheid der Zuid-Afrikaansche Republiek en aanliggende landen van belang zijn.

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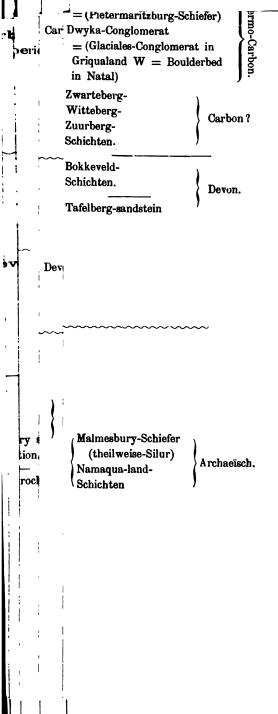
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BRIEF VAN VAN DER KELLEN OVER ZIJNE REIS VAN GAMBOS NAAR HOMBE ').

GAMBOS, 10 Juni 1889.

Geachte Redactie!

Op 15° o' 24" O. L. en 16° 42' Z. Br., waar de Calculavar in de Cunene uitwatert, ligt Hombé, eene kleine nederzetting van ongeveer vijftien blanken, welke daar handel drijven en hunne huizen gebouwd hebben rondom het fort, daar door het Portugeesche gouvernement gesticht, sedert den oorlog van 1885, waarvan ik in een vroeger schrijven reeds gewag heb gemaakt.

Hombé, n. l. het grondgebied der Ovanhombé's, is vrij uitgestrekt; nog meer is dat het geval met het district Hombé, zoo als de Portugeesche kaarten het aanduiden, en dat zich tot ver in den Ovampo uitstrekt.

De Ovanhombé's behooren tot een anderen stam dan de Ovanjannekko's en kunnen samengevat worden met de negers van Mulondo en Otjipungo. Hombé is voor Mossamedes van het grootste handelsbelang, daar hier bijna uitsluitend de runderen gekocht worden, die van genoemde plaats, naar de andere kustplaatsen uitgevoerd worden.

In het begin van Januari van dit jaar bezocht ik Hombé voor het eerst; het wêer was mij niet gunstig, daar de droogte, die tot in Februari aanhield, alles in een dorre zandwoestijn herschapen had.

Ik ondernam de reis in gezelschap van een Portugeesch handelaar, die, evenals ik, een ossenwagen als transportmiddel bezigde.

De weg van Gambos naar Hombé levert zeer weinig belangrijks op; alleen geeft de tocht een denkbeeld van de uitgestrekte wildernis, welke zich tusschen die twee plaatsen uitstrekt, en die grootendeels bestaat uit een

¹⁾ Zie den vorigen jaargang Verslagen en Mededeelingen p. 91.

dicht en ondoordringbaar kreupelbosch, welks hakige doorns, elke poging om er in door te dringen beletten. Alleen de olifant is in staat zich hier een weg te banen.

Het wagenpad volgt in 't begin niet den Calculavar, daar deze een bocht maakt, welke het pad twee à drie dagen zou verlengen.

De eerste trek ("Trek" noemt men een afstand van twee à drie uur, welken men met een ossenwagen aflegt, gewoonlijk van de eene waterplaats naar de andere) gaat men over zwarten leemgrond, tot onder de heuvelrij, welke zich van Oost naar West uitstrekt en waarboven de spitse Tongo-Tongo zich verheft.

Zoodra men dezen heuvel beklimt, verandert de bodem; de zwarte leem maakt plaats voor zwaar zand, waarin het diepe spoor door de ossenwagens uitgeploegd, zich tusschen de doornenstruiken voortslingert.

Van dit punt overziet men een uitgestrekt veld, dat zich als een panorama voor het oog ontrolt; terwijl zich aan den blauwen gezichtseinder, de bergen van Huilla en der Serra de Chella vertoonen, is verder alles slechts één eentonig woud, waarboven hier en daar een spitse bergtop uitsteekt.

Spoedig wordt dit alles evenwel aan den blik onttrokken; het doorngewas wordt hooger, het zand dikker; het knallen der zweepen, de schelle schreeuwen der drijvers bewijzen, dat de achttien ossen, welke voor elk voertuig gespannen zijn, dit met moeite voortbewegen.

Het bosch wordt steeds dichter; de ranken der struiken, met hakige doorns voorzien, vlechten zich over het wagenpad te zamen, en schijnen zich aan 't langzaam voortrollende voertuig te willen vastklemmen.

"Dit is Gambos zijn zandbult" deelt mijn drijver mij mede, "een os", voegt hij er zaakkundig bij, "moet al heel vast wezen, anders trekt hij geen wagen."

Eindelijk bereikten wij eene sterke helling, en maakte het zand plaats voor een harden rotsachtigen bodem, zooals aan den voet van den Tongo-Tongo te verwachten is.

Groote schaduwrijke boomen staan hier en daar verspreid, waaronder de wagens uitgespannen werden en aan het trekvee de gelegenheid gegeven werd zich, aan de hier zich bevindende bron, te laven en eenig voedsel te zoeken aan de verdorde grasstoppels; een vrij karig loon na zulk eene zware inspanning.

De eerste opmerkenswaardige plaats, die wij den volgenden morgen bereikten, is: Mollula of Ponako, dicht bij de rivier de Calculavar gelegen; een klein uit zwarte rotsblokken bestaand bergketentje loopt hier langs den rivieroever, als uit de zwarte leem verrijzende; ook treft men hier menigvuldige Boababs aan, terwijl ook de Miroela-boom hier weer rijk vertegenwoordigd is; op den achter ons liggenden zandbodem ontbrak hij geheel.

De bewoners zijn Ovandiemba's die onder het gezag van den Sobé van Gambos staan. Het verschil in haardracht, tusschen hen en de Ovanjanekka's is 't meest in 't oog loopend.

De mannen bewerken het haar met vet en gestampte boomschors, zoodanig, dat het op vetgesmeerde touwtjes gelijkt, terwijl zij door een smal strookje vel, meestal een slangenvelletje, den geheelen haarbos achter op het hoofd bij elkander binden. De vrouwen bewerken het haar evenzoo met vet, maar hebben het langer, en scherèn bovendien den schedel bovenop geheel kaal, waarna zij het haar langs de slapen weder zoo bij elkander binden, dat de kale plek geheel onzichtbaar wordt.

Vele uren gaans van deze plaats verwijderd, treft men nog steeds negers van denzelfden stam aan, die aan weerszijden van het wagenpad hunne woningen hebben, maar zeer schuw en verwilderd zijn. De oorzaak daarvan is, dat deze arme schepsels, reeds gedurende meer dan twee jaren, bloot staan aan de herhaalde rooverijen der Hottentotten, die iederen wintertijd, beneden Hombé, de Cunene oversteken, en met al de hun eigene bandeloosheid, het recht van den sterkste op deze ongelukkigen toepassen. Beroofd van bijna al hun vee, bebouwen zij hunne akkers, in den zomer, om des winters rusteloos heen en weer te trekken, ten einde aan die gevaarlijke vijanden te ontkomen.

Ver in den achtermiddag, hadden wij de laatste woningen van dit volkje achter den rug, toen wij al heel spoedig groote kudden rooi-bokken aantroffen, waarvan ik er een paar schoot om onze proviand te vermeerderen.

De weg waarover hier het wagenpad voert is zandig en met rotsblokken als bezaaid; toch konden wij, gedurende den nacht, nog een goed eind verder rijden, daar de maan ons goed verlichtte; het was voor ons trekvee een weldaad, daar de zon des daags, zóó fel brandde dat de thermometer in de schaduw tot 28° C. rees. Bij Kohama, onmiddellijk aan den oever der Calculavar, sloegen wij ons nachtleger op. De rivier stroomde niet meer; slechts hier en daar in de bedding werden eenige diepe kuilen aangetroffen, waarin nog water stond; wel een bewijs van de groote droogte, welke dit jaar heerscht, vooral als men daarbij in aanmerking neemt dat de Calculavar de eenige afwatering is naar de Cunene van het geheele plateau aan deze zijde van de Serra de Chella.

Op dit punt splitst het wagenpad zich in tweeen: één langs den rechter-,

één langs den linker-oever der rivier. Wij besloten op den linker-oever voort te gaan en moesten daarom een drift oversteken, waarin echter geen drup pel water was; maar daarbij bevond zich een kuil, waarin zich, naar het scheen, alle krokodillen uit den omtrek hadden teruggetrokken. Dadelijk maakten zij zich van een onzer honden meester, en het scheen wel alsof hunne vraatzucht volstrekt niet op zoude zien tegen een os, zoodat wij bij het drenken van het vee de grootste omzichtigheid in acht moesten nemen.

Op twee uur afstands van deze plaats vindt men "Lord Mago's fontein", zooals die op de meeste kaarten aangeduid staat, daar deze fontein har naam te danken heeft aan het feit, dat die edele Engelschman, toen hij in 1818 een jachttocht hierheen maakte, op die plaats zijn kamp opsloeg.

Wij vernamen hier dat de heer Erichson met zijn jachtgezelschap bij deze fontein gelegerd was.

Hem gaarne willende ontmoeten zadelden wij onze paarden, en reden langs een voetpad naar de aangeduide plaats, zonder echter een spoor der jagers te vinden.

Een troep Blauw-wilde-beesten, die bij de fontein graasde, moest het ontgelden; wij schoten een koe en vingen haar kalf, dat echter na acht dagen bezweek; op den terugweg vermeerderden nog een quaga en een basterd-gemsbok onzen buit. Voordat het vleesch bij de wagens was, was 't nacht geworden, wat ons toch niet belette onzen tocht voort te zetten, totdat wij na anderhalf uur rijdens bemerkten, dat een spoor, ons wagen pad doorsneed, hetwelk zeer waarschijnlijk naar eene fontein moest leiden, "Colowanga" geheeten, welke nog ruim twee en een half uur van die plek verwijderd moest zijn.

Wij vermoedden dat daar wellicht het gezelschap van den Heer Erichson gekampeerd zou zijn, en zeer verlangend zijnde om onze oude vrienden te ontmoeten, sloegen wij hier ons nachtleger op, ten einde hen den volgenden morgen op te zoeken.

Vroeg in den morgen bereikten wij bedoeld punt en ontmoetten dan werkelijk den heer Albert Erichson, Mr. Black, dien ik vroeger in Unbella-land had leeren kennen, en nog eenige Engelschen, ook reeds ouds bekenden. De heer Erichson, die ongeveer veertig gezouten paarden bizich had (gezouten heet hier in Afrika een paard dat aan den hier bestaanden droes ontsnapt is) 1), kampeerde hier ten einde langs de Cunese eenige olifanten te schieten.

V. d. Kellen bedoelt waarschijnlijk een paard dat den droes gehad heeft en ervel hersteld is.

Hij staat aan 't hoofd der firma Carlson, Lyon en Cie die het voornemen heeft, met behulp der Boeren in Angola, een olifants-jacht te beproeven.

Hij kwam van het meer Ngami, en had zijn broeder, den bekenden Axel Erichson, tot daar begeleid, die naar Transvaal vertrokken was, met een aantal ossen, welke in Damara-land gekocht waren, ten einde in de goudvelden verhandeld te worden. Het was noodzakelijk geweest om met jagers en paarden, de runderen de Kalahari-woestijn door te helpen trekken, daar het dikwijls ontzachelijk veel moeite kost, de reeds vrij wilde dieren in het pad te houden, en te beletten dat zij, door den dorst gekweld, naar alle zijden weghollen.

De heer Albert Erichson was met zijn jacht-gezelschap van Ngami, angs de Okovango teruggekomen en door den Ovampo in Umbellaand, om langs de Tjitanda-rivier olifanten te jagen, vanwaar hij bij Quitare de Cunene overtrok. Het gesprek kwam al spoedig op de gisting die allerwegen onder de zwarte bevolking blijft heerschen. De heer Erichton schreef het enkel aan zijn talrijk reisgezelschap toe, dat hij ongehinderd tot daar gekomen was.

In Damara-land heerscht, volgens hem, een geheel valsche toestand. Duitschland heeft, zooals bekend is, dat land onder zijn protectoraat enomen, waarmede de Damara's, onder den invloed van eenige Engelchen, zeer weinig ingenomen zijn.

De Duitsche Commissaris vordert dan ook al heel weinig met zijne iderhandelingen met Kamahereroe, den kapitein der Damara's; feitelijk estaat er dus nog niets van het protectoraat en is de Duitsche invloed nog nul; de vraag is of de Duitsche commissaris er zich nog lang zilig zal kunnen achten.

Eén punt vooral verbittert de Damara's zeer, n. l., dat de Duitschers, e Hottentotten, waarmede eerstgenoemden sedert Anderson's tijd in rlog leven, van ammunitie voorzien hebben, blijkbaar met het doel om Damara's te verzwakken.

Men moet al zeer onbekend wezen met het karakter der Hottentotten, bvers en bandieten van hun ambacht, om te vermoeden dat zij zich n het Duitsche gezag zullen bekommeren.

De weiselende honding van Duitschland is ook oorzaak dat de Boeren pingtonia opgegeven hebben.

In Juli van het vorige jaar keerden hier 10 families terug, de overigen bben zich naar Transvaal begeven. Had men getracht deze lieden op ootfontein te behouden en zoo mogelijk hun aantal met nieuwe trekken, uit Transvaal, te versterken, dan zou men zeker verder gevordezijn dan door een verbond met de Hottentotten. Wil Duitschland in we kelijkheid Damara-land in bezit nemen, dan zal het niet voor kosten moe ten terugdeinzen en moeten trachten de inlanders door geweld van wapenen te onderwerpen.

Menschen, goed met Damara-land bekend, zijn van meening, dat dit land rijkelijk zijn inbezitneming zal beloonen, terwijl tevens de Ovampe tot den staat van vrede zal terugkeeren. Misschien opent Duitschland dan weer een landstreek voor 't verkeer, die in natuurlijken rijkdom voor Transvaal niet zal behoeven onder te doen. Maar laat ik tot mijn vorig onderwerp terugkeeren.

Wij namen afscheid van onze vrienden en keerden naar onze wagent terug om het pad naar Hombé te vervolgen, steeds een zwarte kleigrond die tot aan den rand van Hombé doorgaat.

Den volgenden morgen vroeg bereikten wij de eerste kraal, weder eene zandige vlakte, waar zoo ver het oog reikte, Boabab's en Miroelsboomen den boventoon voerden.

Aan weerszijden van het pad lagen de kralen. De mannen zagen in onverschillige houding het voorbijtrekken der wagens aan.

De vrouwen met hun eigenaardig kapsel, het haar bij de ooren tot ees wiel verwerkt, dat ook aan een spinneweb doet denken, droegen in kalebassen het water aan, voor het dagelijksch gebruik, terwijl de jeugd it dolle sprongen de wagens omgaf.

Alles liet zich hier anders aanzien dan te Gambos, met zijne dichte bosschen, in welker dichtste plekken de kralen als verscholen liggen, en de achterdochtige bewoners zich schuw terugtrekken, als de "Otjenderte" (ziel uit de andere wereld), gelijk zij den Blanke noemen, voorbij komt

Alles herinnerde mij volkomen Otjimpango, waar de bewoners evenmin die stelselmatige schuwheid kennen die de Ovanjannekka's kenmerkt. Portugeezen die langen tijd onder dezen volksstam verblijf hielden, verzekeden mij dat zij in geen enkel opzicht, zoo verraderlijk zijn als de andere volksstammen, maar meer open voor hun gevoelen uitkomen, zoodat de blanke het spoedig bemerkt als zij wrok koesteren. Na den oorlog van 1885, waarin de Ovanhombe's eene duchtige nederlaag leden, was, ma den vrede, hun verkeer met de blanken weder even ongedwongen als te voren.

De Ovanhombe's zijn een veehoudend volk, maar zij leggen zich tevens op den landbouw toe.

Mais wordt, in tegenstelling van Huilla en omstreken, weinig verbouwd;

assambale of kaffer-koren, zooals de Boeren het noemen, is het vooraamste. De sogo, die op ons vogeltjeszaad gelijkt, dient voornamelijk bor de bereiding van bier.

De woningen zijn gelijk aan die der overige negerstammen; in het huisad bestaat, om zoo te zeggen, iets meer weelde, het bier wordt niet, zoob bij de Vanjannekka's, uit afgesneden kalebassen gedronken, maar uit kwijls fraai besneden, houten pullen.

De bewapening der mannen bestaat hier meest uit slaghoedgeweren, in faats der oude vuursteengeweren, en velen bezitten reeds achterladers.

Brandewijn is het voornaamste handelsartikel; een vaatje van ongeveer wintig flesschen wordt met een os betaald, de gewoonte eischt echter dat ben nog een meter of zes katoenen stof en een bosje kralen op den koop begeeft. Geel en rood koperdraad, kruit en lood, ook groote wollen detens komen als handelswaren zeer in aanmerking.

Van de overzijde der Cunene komen ook vele handelaars of quisongo's, too als men hen noemt, hunne ossen te Hombé verkoopen.

Ivoor is zeer schaarsch; ik geloof niet dat er duizend pond van dit arikel in Hombé verhandeld wordt, gedurende het geheele jaar.

Ons doel was, eerst naar het hier nabij liggend fort te gaan, om haarna naar den oever der Cunene te trekken. Na een vollen dag langs de woningen der Ovanhombe's getrokken te zijn, bereikten wij eindelijk penoemd fort. Het is nieuw en in goeden staat; een diepe, gegraven put, waarin steeds water staat, doet het zich gunstig onderscheiden van de andere forten in dit land, waar gewoonlijk water ontbreekt en die dus geen langdurig beleg zouden kunnen volhouden.

De woningen zijn meest alle van palen, met gras gedekt; slechts één woning buiten het fort is van klei opgetrokken.

Het station der Catholieke missie is hier sedert 1885 verlaten.

Wij trokken reeds spoedig af in de richting der Cunene; het naaste punt was ongeveer één uur van het fort verwijderd, wij hoopten voornamelijk daar gras te vinden voor ons vee, maar zagen ons bitter te leur gesteld; alles was dor en zandig, zoodat wij niets anders doen konden dan onze dieren het harde riet langs den oever der rivier te laten eten.

De Cunene had hier reeds zooveel water, dat die niet meer doorwaadlaar was, en de verbinding met den tegenovergestelden oever door middel van uitgeholde boomstammen moest gemaakt worden.

Dit was een bewijs dat het aan den bovenloop der Cunene reeds regende, terwijl hier de zon nog steeds aan het wolkenlooze uitspansel gloeide, en menigen armen neger het hoofd deed schudden, want de hongersnood deed zich reeds duchtig gevoelen; het vorige jaar was de oogst ook reeds te deele mislukt, terwijl het zich nu niet veel beter liet aanzien.

Gelukkig dat de verbazende vischrijkdom dezer rivier, in veler behoet ten voorzag. Duizende visschen, die men in de netten had weten te ver schalken, zag ik dagelijks wegdragen.

Deze visch, ter grootte van een baars en ook grooter, is uitsteken van smaak; als bijgerecht gebruikt de neger een soort van wier, de overvloedig in de half overstroomde valleien groeit, en eene smakelijk groente oplevert.

Dagelijks werd mij visch en deze groente, tegen vergoeding van eenige bosjes kralen, gebracht.

Daar de regen in deze streek nog steeds op zich wachten liet, moesten wij aan onzen terugtocht denken, of liever wij werden er toe gedwongen om dit ter wille van ons trekvee nog al overhaast te doen.

De terugtocht leverde dan ook weinig bijzonders op, dat niet reeds opgemerkt was, gedurende de eerste reis daarheen.

Een jong Blauw-wilde-beest vingen wij nog op een onzer jachttochten, het dier is thans mak en loopt met ons rond, terwijl het 's avonds, als ik het roep, steeds den wagen weder opzoekt.

P. J. VAN DER KELLEN.

OVER LLANO EN SIERRA:

FRAGMENTEN UIT MIJN REISJOURNAAL

DOOR

Dr. H. F. C. TEN KATE.

De volgende bladzijden behelzen het fragmentarisch verhaal van een eistocht, dien ik in Maart en April 1886 in Venezuela maakte, nadat Suriname verlaten had 1). Het hoofddoel van dien tocht was de inboorngen van het tusschen de Orinoco en de Caraïbische zee gelegen geied te leeren kennen 2).

De stelregel, dien ik ook hier gevolgd heb, om slechts datgene te verelden, wat ik zelf gezien en ondervonden heb, moge ter verontschulging dienen zoo het subjectieve in het hier volgend relaas wellicht wat te zeer op den voorgrond treedt. Ik heb echter bij het wedergeven ijner reisindrukken, hoe ephemerisch, en daardoor onvolkomen, ze ook logen zijn, zooveel mogelijk naar getrouwheid gestreeft.

Van het eiland Trinidad komende, was ik de Orinoco opgevaren tot. In Ciudad Bolívar, ten einde van daar uit mijn marsch te aanvaarden. In Ciudad Bolívar door vorige reizigers herhaaldelijk beschreven is, zal mijn verblijf aldaar stilzwijgend voorbijgaan, en mijn verhaal eerst aanngen bij het verlaten dier stad.

Het korjaalvaren, dat in de Guyana's gedurende acht maanden zoo imschoots mijn deel was geweest, van harte moede, was het mij een elkome afwisseling toen de omstandigheden het noodig maakten, mij een ruiter te transformeeren. Zoodra ik in Rafael Fernandez een gids

¹⁾ Vergel. o. a. Tijdschr. Aardr. Gen., Versl. en Meded. 1886.

²⁾ Zie mijn Observations anthropologiques recueillies dans la Guyane et le Venezuels. Sue d'anthropologie, 3e série, t. II, 1887, p. 44; en Revue colon. internat. 1886.

had gevonden, was ik in weinig tijds van paard, zadel, zadeltasschen sporen voorzien, en verbeidde ik met ongeduld het oogenblik waarop zouden kunnen vertrekken.

Don Rafael, een kleurling met het voorkomen van een Don Quichot en in wien het bloed van drie verschillende rassen vloeide, behoot thuis te Aguasai, een dorp in de *llanos* 1), naar een oppervlakkige sch ting ongeveer 110 kilometers noordwaarts van Soledad gelegen.

Daar D. Rafael met een zwaar beladen paktrein met koopwaren tert keerde, nam hij aan, mij voor 20 pesos 3) tot aan zijn woonplaats te i geleiden, en aldaar van een gids voor mijn verderen tocht te voorzien

Den 12den Maart, op het midden van den dag, staken we in een ze boot, onder een blakende hitte, de Orinoco over, ten einde van t tegenover Ciudad Bolívar liggende dorp Soledad de reis te aanvaarden.

Het opladen van de vele burros 3), op wier rug ook mijn corrotes 4) moesten worden gepakt, door de beide Chayma-Indianen, die D. Rafael als drijvers vergezelden, ging z66 langzaam te werk, dat we eerst tegen half 6 's namiddags Soledad den rug konden toekeeren.

Het landschap, dat zich weldra in al zijn uitgestrektheid aan mijn oog ontrolde, herinnerde mij aan de savanna's van Suriname. Hier, evenak daar, witachtig geel, fijn zand op den bodem; langzame, groote terreingolvingen; lange, vale grashalmen en struikachtige boomen. Doch weldts kreeg alles een andere tint doordien de zon ter kimme daalde, en de maan haar helder licht deed schijnen, hetgeen ons in staat stelde, bij een aanzienlijke daling der temperatuur, tot laat in den nacht den rid voort te zetten. De kleine, schamele gehuchtjes Casa-alegre en El Curro, die in diepe rust gedompeld waren, reden we achtereenvolgens zonder oponthoud door. Na eenige uren rijdens begon een schier onoverkome lijke slaap mij te plagen, en moest ik verschillende zelfkwellingen uit denken om niet uit het zadel te glijden. Ten laatste, na nog een lange marteling, hielden we halt te Morichal-largo, een uit slechts enkele huizen bestaand gehucht. Het was toen 2.30 's nachts. Vermoeid, zooals ik zelden in mijn leven geweest was, spande ik mijn chinchorro 5) in een klein in aanbouw zijnd leemen huis.

Na een vrij korte nachtrust gebruikten wij in den koelen morgenstond de koffie bij een der half Indiaansche inwoners van het schamele oord. De weinige huizen waaruit het bestond, waren van in de zon gedroogde

¹⁾ Vlakten.

²⁾ Dollars.

³⁾ Ezels.

⁴⁾ Bagage.

⁵⁾ Hangmet

em gebouwd, en met de bladen van de cobija-palm 1) bedekt. Daar ijn gids en ik aanmerkelijk sneller hadden gereden dan de drrea 1), was ze ver achtergebleven, en aangezien het om verschillende redenen raadam was, dat wij die niet te veel uit het oog verloren, schoot ons niets ders over dan te wachten. Mij was die gedwongen rust niet onwelom, want zij stelde mij in staat, den omtrek wat nauwkeuriger op te men.

Het huizencomplex lag in de nabijheid van een dier talrijke kleine vieren, die in onregelmatige parallellen door de oostelijke *llanos* van t het westen, hetzij naar de Orinocodelta, hetzij naar de golf van aria stroomen. Daar men in de *llanos* bijna nergens anders water aaneft dan in deze ondiepe stroompjes, is hun aanwezigheid reeds van verre herkennen, door het groen der talrijke cobija-, moriche-3), piritú-4) n andere palmen langs hun zandige oevers. Zij vormen als 't ware de asen der *llanos*, en breken de monotonie der vlakten. Het stroompje, aaraan we ons bevonden, heette, evenals het gehucht, Morichal-largo, us genoemd naar den moriche, en beteekenende "groote plaats der mautiapalmen". De bodem bij Morichal-largo bestond uit grof, rossig geel and, hier en daar met grootere verweeringsproducten, waaronder stuken conglomeraat, als bezaaid. De leelijke chaparro 5) met zijn harde, s verkreukelde bladeren, is de meest voorkomende boom der *llanos*, bowel hier als verder op. Nu en dan verrijst een breed getakte, statige Kcornoque 6), met gele bloesems beladen. Kuifpatrijzen en grondduiven emen op uw nadering, luidruchtig klapwiekend, de vlucht; groene parleten schommelen in de takken; hagedissen dartelen in de felle zon, en e nijvere mieren gaan op het heete zand ongestoord hun gang.

Eerst tegen 5 ure 's middags kwam de *drrea* opdagen, en een half uur ter zaten we weder in den zadel. Daar de arme lastdieren behoefte aan ust hadden, legden we niet meer dan 4 of 5 kilometers af, en legerden ns voor den nacht onder een paar zware *algarrobo* 7)-boomen. De In-

¹⁾ Deze palmsoort (Copernicia tectorum) wordt cobija = dak geheeten, omdat men er de llanos algemeen de woningen mede bedekt.

²⁾ Paktrein met ezels.

³⁾ Mauritia flexuosa.

⁴⁾ Guilielma piritu.

⁵⁾ Curatella americana.

⁶⁾ Bowdichia virgilioides.

⁷⁾ Hymenaea courbaril.

dianen, stille gedweeë menschen, roosterden op een houtvuur eenige sneden vleesch, die met een homp grof brood ons avondmaal vormden. Later in mijn hangmat wiegende, genoot ik van den wonderschoonen stillen avond. Het zilverwitte maanlicht, gebroken door het loover der reusachtige boomen, had nog genoeg kracht om onze kampplaats te beschijnen. Om het half uitgedoofde vuur waren de hangmatten gespannen, waarin Don Rafael en de Indianen hun cigaretten lagen te rooken; de ezels lagen neder of stonden hun welverdienden mats te kauwen; de zware pakzadels, balen, zakken en kisten waren als een bolwerk om ens heen geplaatst.

Hoe menigen schoonen nacht in de bosschen van Suriname hadden de muskieten mij alle genot vergald, alle rust ontnomen. Hier echter bleef ik van die plaag verschoond, en hoewel een aantal zoogenaamde houtluizen 1) de stammen onzer algarrobos tot hun heirbaan hadden gekozen, had ik mij, door de touwen mijner hangmat met carbolzuur te bestrijken, voor een mogelijke storing in mijn "klimaatschieten" en slaap gevrijwaard. De onbestemde geluiden der vlakte streelden nog lang mijn oor, de flonkerende sterren bekoorden nog lang mijn oog, alvorens de slaap mij overmande.

Ten 6.45 's morgens was onze karavaan weer in beweging, en zette haar langzamen gang naar het noorden gedurende ruim vier uren onafgebroken voort. We hadden toen de Arreyito (El Rillito?) een tak van de Rio Tigre bereikt. De weg dien wij achter ons hadden liggen, leidde steeds over een aaneenschakeling van uitgestrekte platte terreingolven en waterbevattende geulen met morichales. Aan de Arreyito verraste mij een weelderige plantengroei, in welks lommer wij ons een paar uren ophielden. Ik zag hier voor het eerst de eigenaardige, als een keten gewonden liane, die men hier cadena de bejuco 2) noemt.

Tegen 5 ure bereikten we de eigenlijke Rio Tigre, na een uitgestrekt terrein met jopo, een struik met fijne blaadjes, te zijn gepasseerd. Aan een rancho³) stijgen we af, om er den nacht door te brengen; en niettegenstaande de half Indiaansche bewoners weinig ingenomen schenen te zijn met onze komst, lieten we ons daardoor niet afschrikken.

Een aantal Caraïben-Indianen, die men hier Caribes noemt, hielder zich bij den rancho op, ten einde voor een karig loon tijdelijk bij den

¹⁾ De larven van Termes morio, in Venezuela comején geheeten.

²⁾ Schnella splendens.

³⁾ Kleine landhoeve; hut.

anchero in het veld te arbeiden. De aanplantingen bestonden uit suikerriet, bananen en cassave. De laatste wordt in deze streken yuca geheeten.

Deze Caratben geleken in vele opzichten zeer op die van Suriname. Een geelachtig bruine huidskleur; een kleine, eenigszins ineengedrongen gestalte, niet zonder forschheid; hoekige gelaatstrekken en een onverschillige uitdrukking; een blauwe camis 1) om de heupen; de vrouwen een naald door de onderlip, ziedaar in het kort hun voorkomen. Alleen was er verschil met de Surinaamsche Caratben op te merken in de haardracht der mannen en de versiering van het onderbeen der vrouwen. Deze Indianen behoorden thuis in het westen, bij Cantaura, in den staat Barcelona.

Een indompeling in de acequia²) stelde mij eenigermate schadeloos voor mijn slecht souper. Trouwens een mager dieet, en, om mij van een Surinaamsche uitdrukking te bedienen, "pinaren"³) zou hier, in *llano* en sierra⁴), mijn deel zijn. Al mijn proviand bestond bij het verlaten van Ciudad Bolívar uit zes blikjes verduurzaamd vleesch en twee kleine flesschen inlandsche rum, waarvoor ik niet minder dan 6 fuertes⁵) betaald had. Waarlijk geen overvloed voor een tocht van achttien dagen! Voor 't overige moest ik mij vergenoegen met cassavebrood, papelón⁶) en een enkele maal een stuk kaas. Toen ik in de sierra kwam, werd de cassave door artpa⁷) vervangen, hetgeen een groote verbetering was. Don Rafael had mij vóór ons vertrek uit Bolívar verzekerd, dat ik onder weg volop van alles zou vinden. Van een Venezolaansch standpunt had hij gelijk.

15 Maart. — We hebben de sterk kronkelende Rio Tigre met haar weelderig begroeide oevers doorwaad en bereiken kort daarop een rancho, waar wij weder de arrea moeten afwachten. Al wachtende gaat de dag voorbij. De rancho is, evenals alle anderen in deze streek van Venezuela, armoedig. Uit leem gebouwd, met een dak van cobija-bladen en een harden leemen vloer, vol kuilen en oneffenheden, bevat hij gewoonlijk van meubilair niets dan een ruwen tafel, een of twee houten stoelen, eenige lege kisten en de noodige chinchorros. Eenige schurftige

¹⁾ Doek.

²⁾ Trens of greppel tusschen stukken bouwland.

³⁾ Gebrek lijden, ontbering hebben. 4) Gebergt

⁵⁾ I fuerte = cenige centavos meer dan cen peso.

⁶⁾ Bruine broodsuiker.

⁷⁾ Maïsbrood.

honden, in een staat van chronische verhongering, een aantal kippen en dikwijls een paar parelhoenders, hier guineos geheeten, zijn de gewone huisdieren van den rancho, behalve kakkerlakken en ander dergelijk gedierte, behoorende tot die categorie, die men hier onder den karakteristieken collectiefnaam van plaga samenvat.

Daar D. Rafael, op zijne wijze, een onderhoudende causeur is, en volop stof vindt om mij uit zijn veelbewogen leven te verhalen, valt de tijd mij niet lang, te meer daar ik onder de insecten een en ander van belang vind. Hoe zeer het vlietend water der Tigre ook uitlokte tot een bad, weerhoudt mij D. Rafael daarvan, wegens het veelvuldig voorkomen van de gevaarlijke raya 1), die zich hier half in het zand woelt en door mimicry bijna niet te onderscheiden is. Een felle brand woedt in de grasvlakte ten oosten van ons, zelfs zóó nabij, dat het den schijn heeft alsof hij ons weldra zal bereiken; doch door een dier geheel onverwachte wendingen aan branden eigen, breidt het vuur zich niet uit. De vuurgloed echter, gepaard aan de uitstralende felle zonnehitte van den bodem, doet de atmospheer zoo trillen en warrelen, dat het oog er van vermoeit. We zoeken daarom het lommer der fraaie tamarinde-boomen, wier heerlijk verfrisschende peulvruchten in menigte zijn afgevallen. Een andere, eenigszins op de tamarinde gelijkende boom dien ik hier aantref, is de caña fistula²). Hij draagt lange, ronde peulvruchten, die een harsachtig vocht bevatten, hetwelk als volksgeneesmiddel wordt aangewend.

Kort vóór zonsondergang breken we eindelijk op, nadat de drrea is aangekomen, en deze, na veel getalm met het vaster snoeren der buikriemen en de strikken der pakzadels, weder in beweging is geraakt. Gedurende een vijftal uren zijn we en route. Het is een koele, onuitsprekelijk schoone, stille nacht. Maan en sterren wedijveren in glans; aan den oostelijken horizon vertoont de grasbrand zich als een vurige streep. Alles zou tot mijmering hebben gestemd, indien niet Don Rafael, op zijn vuil witten ezel gezeten, nu en dan uit volle borst een lied had gezongen, en, daar zijn repertorium niet groot scheen te zijn, tot vervelens toe dezelfde strophen herhaalde. Hoe meer we de Rio Chibe naderen, hoe meer verandert langzamerhand het terrein. De golvende llano gaat allengs over in mesas 3), door kloven, hier farallones geheeten, doorsneden. Kort nadat we de Rio Chibe met haar dichtbegroeide oevers hebben doorwaad, bereiken we ons nachtkwartier. Zonder omslag plaatsen we onze

¹⁾ Steekrog, Trygon hystrix.

²⁾ Cassia fistula.

³⁾ Tafelland.

rossen in den corral 1) en spannen onze chinchorros in een open hut, naast die der, slechts voor een oogenblik, ontwaakte bewoners. Die menschen zijn zoo arm, dat ze zelfs bij het karig ontbijt geen koffle hebben, iets wat anders zelden in den vroegen morgen bij den Venezolaan ontbreekt. In plaats daarvan vergenoegden we ons met guardpo, d. i. in heet water opgeloste papelon.

Den geheelen dag voerde onze weg — of liever ons spoor — over mesas van rooden zandsteen, en door diepe farallones, waarin veelal de púrguo, een caoutchouc-boom, groeide. Op den nu eens gelen of bruinen, dan weder witachtigen zandsteen-bodem, liggen hier en daar piedras preñadas²), eenigszins op koprolithen gelijkende klappersteenen. De binnenste korrels, die duidelijk rammelen, gelden bij de landbevolking als geneesmiddel bij hoest en ongesteldheden van het uro-genitaal apparaat.

Meer dan eens vertoonen zich schoone vergezichten; plekken, zooals men ze vindt waar een krachtige erosie een groote rol gespeeld heeft bij de formatie der bodemplastiek. Vooral zijn het torenvormige zandsteenrotsen en kloven met loodrechte wanden. De Rio Guibimba met haar wuivende palmen en zandige vlakke oevers vertoont onder de gloeiende zon en den strakken hemel een onvergetelijk woestijngezicht. In het eenzame gehucht Oritupáno houden we de heete uren van den dag stil. Waar in de meer breede, ondiepe ravijnen de bodem moerassig is, groeit de rdbano, een caladiumsoort met groote bladeren, en de onvermijdelijke moriche. Een lichtgrijze grassoort bedekt hier en daar de terreingolven. In een hato 3) op den rand van een mesa gelegen, stijgen we af voor den nacht. De eigenaar is een Corsicaan, wien de golven der levenszee op deze afgelegen plek hebben doen stranden. Ik verheug hem niet weinig met de konde, dat ik zijn eiland heb bereisd, zijn verre vaderland, dat hij zoo gaarne nog eenmaal zou begroeten. Maar de schoone, jonge vrouw, die met haar groote donkere oogen, zachtkens in de hangmat wiegend, ons gesprek beluistert, schijnt hem zijn ballingschap te vergoeden.

De oostenwind, die dagelijks waaide, en de drooge heete temperatuur aanmerkelijk afkoelde, blies dien middag met verdubbelde kracht...

¹⁾ Omheining, die als stal dient.

^{2) .}Gevulde, zwangere steenen".

³⁾ Vechoeve.

oog het kustgebergte in de nevelige verte. De hoogste top, de Turumiquire 1), verschuilt zich in de wolken. Ook aan den zuidelijken dalwand van de Rio Guanipa, die we straks zullen doorwaden, ontrolt zich naar het noorden, oosten en westen een prachtig vergezicht. Tafellanden en kloven schakelen zich eindeloos aaneen, en de enkele woningen en gehuchten, hier en daar verspreid, verliezen zich in de eenzame uitgestrektheid.

Niet ver van Aguasai, dat we na vijf uren rijdens van den hate bereiken, ontmoeten we een Caratbischen jager, die ons zijn buit, een konijn met korte ooren 2) en eenige leguaneneieren te koop aanbiedt. De arrea was ver, ver in de achterhoede. We hadden ons de beide laatste dagen niet meer om haar bekommerd, daar we te Aguasai den tijd hadden haar komst af te wachten.

Daar hotels te Aguasai ternauwernood bij naam bekend zijn, bood D. Rafael mij kost en inwoning aan, en daar ik geen keus had, moest ik dit twijfelachtig aangename aanbod wel voor lief nemen.

Trivilin, het bruine ros, dat mij van Soledad af gedragen had, was spoedig ontzadeld, en mocht in den corral een welverdiende rust genieten.

Don Rafael behoorde niet tot de rijken der aarde. Zijn nederige leemen woning had slechts een paar vertrekken, waarvan er een tegelijk winkel, zit-, eet-, en voor een deel ook slaapkamer was. Wanneer men weet, dat het gezin uit de señora, een volwassen zoon, een half dozijn kleine, vuile kinderen, Don Rafael's schoonzuster en haar dochter, benevens een paar peones 3) bestond, die allen met eenige schurftige honden en een aantal vermieselde kippen deze ruimte moesten deelen, dan zal men wel willen aannemen, dat ik als logeergast niet zeer veel comfort had. Ik verhing dan ook spoedig mijn hangmat achter het huis, voor de bakkerij en dicht bij den corral, ten einde zooveel mogelijk mijn vrijheid en rust te handhaven.

Aguasai of Aguasay, welks naam D. Rafael meer spitsvondig dan juist, aguas hay = "er zijn wateren" etymologiseerde, is een dorp met eenige honderden inwoners, die van een weinig landbouw en veeteelt leven. Een ruime zandige plaza, begrensd door de kerk en rijen lage huizen, vormt

¹⁾ Aldus hoorde ik den naam uitspreken. Op kaarten vindt men gewoonlijk Turnmiquiri.

²⁾ Lepus brasiliensis.

³⁾ Arbeiders, bedienden; kortom lieden uit de laagste volksklassen, die op de eene of andere wijze dienstbaar zijn.

het centrum van het stille oord. Eenige kleine rechte straten vertakken zich van daaruit in verschillende richtingen. De woningen hebben alle hetzelfde karakter: uit leem gebouwd, nu en dan bepleisterd, een puntig dak van palmbladen, en alle vertrekken gelijkvloers. Hagen van groote cacteeën, waaronder een opuntiasoort, ook hier tuna geheeten, omzoomen de kleine tuinen die zich achter de woningen of in den onmiddellijken omtrek van Aguasai bevinden. Aan den zuidrand eener hooge, langgestrekte mesa gelegen, beheerscht men van Aguasai uit een groot gedeelte van het wijde Guanipadal, met zijn grillige, bonte en vale zandsteenvormingen, zijn dichte morichales, en zijn Indiaansche hutten, heinde en verre over mesas en farallones verspreid.

Zoolang geen revolutie het land beroert, verloopt het leven te Aguasai als een rustige sluimering. Zonder behoeften, met weinig tevreden, gelukkig met het heden en zonder zorg voor het toekomende, zijn die menschen, trots hun armoede, en vuil, en hun aartsvaderlijke zeden, in hun eenzaamheid zoo tevreden en gelukkig als geen spoorwegen en electrische verlichting hen zouden kunnen maken. In de landen der zon, onder natuurgenooten van andere kleur, leert de beschaafde Europeaan, die dikwijls in den waan verkeert, dat hij alle voorrechten bezit, lessen van levenswijsheid, die hij nooit vergeet

Nu ik allen tijd had land en volk gade te slaan, miste ik meer dan ooit de instrumenten die mij, met de vrucht van zeven maanden reizen, op een onzaligen Decemberavond te Paramaribo ontstolen werden. Van warm of koud, hoog of laag, ver of nabij kon ik dus slechts volgens subjectieve uitdrukken spreken. Zelfs wat mijn koers betrof, was ik, toen ik later in de kustsierra kwam, niet zelden letterlijk en figuurlijk mijn tramontane kwijt, die ik in de open vlakte, waar zon of sterren altijd te vinden zijn, zoo licht niet uit het oog verloor. Gelukkig echter was ik in het bezit van al mijn anthropometrische instrumenten en het benoodigde om zoologische voorwerpen te verzamelen. Zooveel dus de omstandigheden het veroorloofden, zocht ik mijn kennis en verzameling te verrijken.

Zoowel te Aguasai als ver in het dal der Guanipa spoorde ik de afstammelingen der oorspronkelijke bewoners op. Het was voorwaar geen gemakkelijke taak om uit het babel van over en weergekruiste kleurlingen de oorspronkelijke Chaymas 1) en Cumanagotos, eens de onbeperkte heerschers dezer streken, te ontwarren. Sedert Humboldt van de

¹⁾ Men zeide hier Chaymés (uitgesproken Tjai'més) en niet Chaymas.

Chaymas uit eigen aanschouwing een beschrijving gaf 1), schijnen dezen zich, evenals de Cumanagotos, waarschijnlijk tengevolge van de opheffing der missies, aanmerkelijk te hebben veranderd.

In kleeding gelijkende op de overige bewoners, hebben zij hun taal gedeeltelijk verloren; van vroegere zeden en gewoonten is bijna niets overgebleven; het stamverband is verbroken, en zoo een dermate veranderde bevolking nog wetenschappelijk belang kan inboezemen, dan is het wel uitsluitend uit een physisch anthropologisch oogpunt. Ten einde de zaak nog verwikkelder te maken, wist ik dikwijls niet of ik met een Chayma of een Cumanagoto dan wel met den vertegenwoordiger van een anderen stam te doen had, om reden, dat individuen, die ik anthropologisch als Indianen beschouwde, ten stelligste ontkenden, dat te zijn, en wel om dezelfde redenen als die welke ik vroeger en later in Mexico geldig vond, Of men wilde, uit een soort van valsche schaamte, niet bekennen tot het ras der gentiles (heidenen) te behooren, of men wantrouwde mijn vragen omtrent hun afkomst en verwantschap. Was er eindelijk een die toegaf, dat hij een Indio was, dan kon ik somtijds niet uit hem krijgen, tot welken stam hij behoorde. Waar D. Rafael beweerde, dat ik met een Chayma te doen had, verzekerde een ander, dat ik een Cumanagoto voor mij had; en zoo ging het ook later voort, toen ik mijne nasporingen voortzette in de cordillera der kust, te Caripe, Cumanacoa en andere plaatsen.

Daar het echter bekend is, dat zoowel de Chaymas als Cumanagotos tot de groote familie der Caratben behoorden, deed het, van mijn standpunt beschouwd, niet veel ter zake, daar het toch tot de taak van den anthropoloog behoort, na te gaan uit welke somatologisch verschillende elementen een linguistische of ethnologische stam of familie bestaat. De eigenlijke Caratben evenwel, die ik in dit gedeelte van Venezuela ontmoette, gaven door hun, mij welbekend voorkomen, niet de minste aanleiding tot misverstand.

Niet meer dan 5 mannelijke individuen, hetzij Chaymas hetzij Cumanagotos, kon ik te Aguasai uitvoerig anthropologisch onderzoeken, waaraan ik hier slechts wil ontleenen, dat hun gestalte gemiddeld 1,568 M. bedroeg, en hun schedel index subbrachycephaal (82, 89) was, en zij mesorrhin (79, 81) waren.

De gelaatskleur is in den regel warm lichtbruin of geelachtig; het haar, 't behoeft nauwelijks gezegd, ravenzwart; de oogen donkerbruin; de tanden onregelmatig en veelal slecht. De gelaatsuitdrukking is bij de meeste individuen apathisch, weinig intelligent en goedig. Zoowel uit

¹⁾ Voy. rég. équin, t. 3, Ch. IX, ed. in 8°.

ijn metingen als uit mijn talrijke waarnemingen op het oog kwam ik t het resultaat, dat de inboorlingen dezer streken, dezelfde, zoowel de wijkende als de gemiddelde, kenmerken bezitten als de Caratben, Aroken en Warraus van Suriname en het overige door mij bezochte Guyana 1). De hutten der Indianen in den omtrek van Aguasai en elders bestonin gewoonlijk uit een geraamte van hout, aan alle kanten min of meer et gedroogde palmbladeren bedekt. Zij herinnerden aan sommige wongen der Indianen van Suriname. Doch ook vele Mestiezen in verschilnde graden, waaruit de bevolking des lands overwegend bestaat, woonen in dergelijke primitieve hutten.

Van ethnographische voorwerpen was gewoonlijk geen spoor te vinden; nen dan slechts trof ik een boog en pijlen en een mardca²) aan. De tardca toch is het dansmuziekinstrument bij uitnemendheid, niet slechts j vele Zuid-Amerikaansche Indianen, maar ook in het heete gedeelte in Noord-Amerika speelt dit instrument onder andere benamingen, een root rol.

Evenals alle Creolen, zij mogen dan min of meer vermengd zijn met hdianen, Negers of Joden, of niet, zijn ook de Venezolanen zeer mukaal. Muziek en dans zit hun in het bloed; bij muziek en dans ziet ge en Creool in zijn element; dan leeft en geniet hij.

Ter gelegenheid van San José (St. Jozef) woonde ik te Aguasai een roeve daarvan bij.

's Avonds gingen eenige ingezetenen, een kleine kapel vormende, in de pornaamste woningen rond, om eenige stukken ten beste te geven. Ook ij Don Rafael werd in een der vertrekken alles zooveel mogelijk opgelimd en plaats gemaakt, ten einde de muzikanten naar behooren te ontangen. Deze hadden vier verschillende instrumenten: de mandóla, den udtro 3), de violine en de fluit.

Hoewel geheel uit het hoofd, speelden deze mannen voortreffelijk. De puziek, in hoofdzaak Spaansch, droeg evenwel dat eigenaardig karakter, etwelk de Amerikaansche Creolen haar hebben verleend, en waardoor ij wellicht meer gewonnen dan verloren heeft. Hartstochtelijk, wegsleend en smachtend, en daarin slechts geëvenaard door de czardas der Iongaarsche Zigeuners, heeft deze muziek door haar eigenaardig wiegen-

¹⁾ Zie mijn Observations anthropologiques etc., l. c.

²⁾ Rammelaar van kalebasschaal.

³⁾ Soort van viersnarige guitaar.

den rhythmus, nu juichend, dan treurend, een onwederstaanbare bekoring. Zij behoort evenzoo uitsluitend thuis onder den helderen hemel der keerkringslanden, bij palmgewieg en stargeflonker, als slechts de lenige Creoolsche vrouw bij haar danzas en valses weet te dansen.

Mijn verblijf bij Don Rafael baarde eenig opzien te Aguasai. Een jorungo 2), en bovendien een huero 3), uit een ver land. waarvan niemand ooit den naam gehoord had; in een wit pak en met een helmhoed op het hoofd; den doctor, die, evenals el baron de Humboldt, steenen, planten en dieren bekeek alsof ze heel wat waard waren, en die vooral den menschen zulke vreemde vragen deed, moest een ieder zien.

Wanneer ik met Don Rafael den maaltijd deelde, dan kwam er vaak een nieuwsgierig groepje burgers aan de deur staan, elkander hardop hun opmerkingen over mij mededeelende. Waschte ik mij 's morgens, en kamde mijn haar en baard, tot ieders verwondering, dan kwam het geheele gezin van Don Rafael er naar kijken. Drentelde ik door "'s heeren straten", dan vertoonden zich aan iedere deur een hoofd, en volgde mij een troepje kinderen, van verre of nabij. Hierin lag echter geen achterdocht of kwaadwilligheid, maar slechts kinderlijke verwondering en nieuwsgierigheid. Dergelijke tooneelen herhaalden zich met kleine plaatselijke variaties bijna overal waar ik kwam. Zonder er mij veel aan te storen, was het toch somtijds zeer hinderlijk. Te Cumaná ging het eens zóó ver, dat ik een aantal indringers op een vrij onzachte manier het vertrek deed ontruimen.

Onder de dorpsjeugd te Aguasai had ik spoedig vriendjes. Zij togen met mij op mijn vele wandeltochten en jachtpartijen; wezen mij den weg; vingen hagedissen en insecten voor mij; kortom zij deden tegelijk als gidsen, drijvers en jachthonden dienst. Vooral de kleine, chocoladekleurige peon van Don Rafael, een arm afgesnauwd Zamboknaapje, sloot zich bij mij aan als een trouwe hond. Nooit was hij gelukkiger dan wanneer hij mijn jachtgeweer mocht dragen, en ik hem, bij onze thuiskomst een of twee reales 4) schonk, die hij dan spoedig aan papelón versnoepte. . .

Het dierenleven in den llano, althans in het oosten van Venezuela,

¹⁾ Nicht.

³⁾ Blonde.

²⁾ Vreemdeling.

⁴⁾ Een real = $\frac{1}{n}$ neso.

arm in vergelijking met de woudstreek. Vooral voor hem die uit de losschen van Guyana in deze vlakten komt, is dit verschil opvallend.

Gedurende acht dagen rijdens door de *llanos* — van Soledad tot San Felix heb ik, behalve de reeds bij Morichal-largo genoemde dieren, weiig meer gezien dan eenige vogels, waaronder vooral alcaravanes, 1) cariieris, 2) zamuros 3) en tijeras. 4) Wat zoogdieren betreft, zoo hoorde ik en paar malen 's nachts het geluid van brulapen 5) in de morichales. In het voorbij gaan noem ik nog de bijenkorfvormige termietennesten, die nen hier en daar op den zandigen bodem aantreft.

Ook het dal der Guanipa bij Aguasai leverde niet veel dieren op. Het alrijkst waren drie soorten van duiven, paloma, palomita en potôca geleeten; de laatste is een grondduitje. Dank zij mijn escopeta 6) prijkten niet zelden exemplaren van alle drie soorten op D. Rafael's disch. Verchillende soorten van hagedissen, waaronder vooral de guaricongo komen in menigte voor. De cachimba 7), een eigenaardige sprinkhaan, liedt door zijn groote gelijkenis op een grasspriet, een leerzaam voorbeeld van mimiery. Onder de overige insecten zijn de vlugge boomkakerlakken, die onder de droge schors leven, het talrijkst.

Menigmaal was mij de saprijke, eigenaardig wrang smakende vruchtengel van den merey 8) die hier veelvuldig voorkomt, eene lafenis bij nijn omzwervingeu in de heete zon. De eigenlijke vrucht van dien boom, na Nederland onder den volksnaam van "Atjehnoot" bekend, wordt hier peroosterd gegeten, en smaakt naar noten. Zoowel vruchten als vruchtengels van den merey schijnen bij de Caratben gezocht, want ik trof niet ver van Aguasai een troepje Caratben aan, die zich met de inzameling karvan bezighielden.

De bewoners van Aguasai putten hun water uit de eenige kleine bron, ie aan den voet der mesa ligt. Zoodra bij het eerste schemeren van den lag, volgens Venezolaansche gewoonte, de sterke, geurige café de la ladrugada 9) was gebruikt, kon men een schare vrouwen, meisjes en

¹⁾ Chettusia of Chaetusia sp.; een soort van renkievit.

²⁾ Polyborus brasiliensis.

³⁾ Cathertes atratus.

⁴⁾ Milvulus sp.

Hier onder den naam van araguates bekend, van waar de Fransche naam leuates voor Mycetes is afgeleid.

⁶⁾ Jachtgeweer.

⁷⁾ Bacillus sp.?

⁸⁾ Anacardium occidentale.

^{9) &}quot;Koffie der vroegte"; mergenkoffie.

jonge knapen in de ochtendkoelte de steile voetpaden der mesa zien al dalen en opklimmen, voorzien van aarden potten, om water te scheppel voor de behoefte van den dag.

Dat de bron zelf en het daaruit ontspringende beekje, behalve voor drinkwater, voor verschillende andere doeleinden werd gebruikt, was mit bekend. Een enkele maal had ik er een peon zijn stoffige leden in zien baden; menigen keer de vrouwen er kleederen in zien wasschen, en mit vroegere ondervinding bij de Moqui-Indianen in Arizona gedachtig, over mijn afkeer heen gezet. Maar toen ik op zekeren middag een jeugdigen aan verruga 1) lijdenden Indiaan zijn met zweren bedekt lichaam in de bron zag baden, toen werd mij de walging te machtig, en dronk ik van dat oogenblik af aan te Aguasai geen water meer.

Veel zieken schenen er overigens te Aguasai niet te zijn. Een genees heer was er niet. Don Rafael vervulde somtijds die rol, en die van apotheker, welke beiden hem werden gemakkelijk gemaakt door verschillende Amerikaansche patentmedicijnen. Mijn vroegere meening, in het Vern Westen opgedaan, dat kwakzalversmiddelen, met besmettelijke ziekten en sterken drank, de voorloopers der zoogenaamde beschaving zijn, vond ik hier, in het hart van den *llano*, bevestigd.

Op zekeren avond met Don Rafael over de *mesa* gaande, nam ik, kort na zonsondergang, het eigenaardig schemeringsverschijnsel waar, door wijen Dr. Sachs, verder westelijk in de *llanos* waargenomen en afgebeeld bedoch het was minder intensief, onduidelijker en duurde korter. Ik kan niet beter doen dan dit luchtverschijnsel te beschrijven met de woorden van Sachs b.

¹⁾ Framboesia; een chronische infectie-ziekte, in Suriname bekend onder den name van yaws, en elders onder dien van bouba, patta, pian enz. Zij schijnt een andere ziekte te zijn als de verruga van Peru.

²⁾ Hidrosadenitis? 3) Zwaluw.

⁴⁾ Carl Sachs, Aus den Llanos. Schilderung einer naturwissenschaftliche Reise nach Venezuela. Leipzig 1879, S. 203-204.

Der fast völlig wolkenlose Himmel zeigte am westlichen Horizont einem schmalen, purpurroth erglühenden Saum. Von der Stelle, an der die Sonne untergetzucht

In de buitengewoon droge atmospheer der *llanos*, komen, evenals in woestijnstreken van Arizona en Nieuw Mexico, verschillende electrische rschijnselen voor.

Zoo wees Don Rafael mij op de mesa een plek, waar hij 's avonds een am of dwaallicht van boom tot boom gevolgd had. Ik ben niet zeker mijn brave gastheer mijn verklaring wel zoo eenvoudig vond, en er, et het bijgeloof den llaneros 1) eigen, niet iets anders achter zocht. De llanos van Venezuela bieden overigens door dien drogen, zuiveren ampkring een uitmuntende gelegenheid, de sterren en de verschijnselen n den tropischen hemel waar te nemen. Hoe meer de maan allengs mam, en het licht der sterren daardoor aan intensiteit won, des te seer kon ik de bekende beelden van het zuidelijk hemelrond waarnemen. Laar hoe schoon en verheven de tropische sterrenhemel ook is, en hoeeer hij den lof verdient, dien vele reizigers hem hebben toegezwaaid, ik on in het Zuiderkruis, dat men van het eene reizigersgeslacht op het ndere, tot vervelens toe bovenmate heeft opgevijzeld, zooveel schoons n bekorends niet vinden. Het zodiakaallicht en de Magelhaensche wolken, relke laatsten aan den Melkweg herinneren, maakten op mij een veel heperen indruk.

Ook	zandhoozen,			een	gewoon			V	verschijnsel				in	droge		heete		streken,		
men	in	de	llanos	voor			•	•	•	•	•				•	•				•

Hoewel reeds den avond van den tweeden dag, dien ik te Aguasai vertoesde, de achtergebleven drrea was aangekomen, en daaronder ook mijn bagage, had ik die plaats nog niet verlaten omdat ik voor mijn toel nog niet genoeg gezien had, en dewijl mij nog een gids voor mijn verdere reis ontbrak. Zoo vergingen dan te Aguasai vijf dagen. Was ik

war, stieg ein prächtig blauer Lichtstreifen, sich allmälich verbreitend, in der Richang der Ekliptik bis zur Höhe von 45° empor; durch seine tief blaue Farbe stach er nicht nur gegen die von ihm durchschnittene rothe Zone, sondern auch gegen den mattblauen Abendhimmel in auffallendster Weise ab. In der Richtung nach Norden met dicht daneben ein schmälerer, weniger intensiver Streifen sichtbar; auf der Südmite dagegen unterschied man vier weitere, in regelmässigen Abständen auf einanderfolgende Streifen, von denen der letzte, etwa 30° von den Hauptstreifen entfernte, der kensivste aller Nebenstreifen war. Die Nebenstreifen liefen in einer zu dem Hauptstreifen fast parallelen Richtung, nur eine schwache Convergenz nach dem Horizonte war zu bemerken."

¹⁾ Bewoners der vlakten.

niet op het pad, dan lag ik, gedurende de heetste uren van den dag, i mijn hangmat, onder het afdak der bakkerij, wakend te droomen, zood men dat slechts in de tropen leert, of Humboldt's "Ansichten der Natur" dat onovertroffen meesterwerk, voor de zooveelste maal te herlezen.

Eindelijk bezorgde Don Rafael mij een gids in de persoon van Manue Maria*, een ouden, grijsgebaarden Neger van het eiland Margarita. Voo 45 pesos nam hij aan, mij te paard, en mijn corrotes, op ezels gepakt, naar Cumaná te geleiden. De afstand van Aguasai naar Cumaná bedraag in rechte lijn, naar schatting, ongeveer 140 kilometers; maar in werke lijkheid, wegens de vele stijgingen en krommingen van den weg, veel meer.

22 Maart. — We zijn de Cari en de Tonóro, twee ondiepe riviertjes, overgetrokken, alvorens we onder een dichtgebladerden mango-boom?) rust houden voor ons almuerzo?). De gisteren gevallen regen, de eerste van het seizoen, heeft zich niet herhaald, en onder een felle zon trekken we langzaam verder noordwaarts.

De grijze Neger in zijn blauwroode cobija 4), het hoofd bedekt met een reusachtigen strochoed, de voeten op sandalen, gaat zwijgend door het heete zand achter de zwaar beladen ezels voort. Een lichtbruin paard, even onsierlijk, maar even taai als zijn voorganger Trivilin, draagt mij en mijn volgepakt zadel.

Het terrein en het uitzicht gelijken op die ten zuiden van Aguasi; doch te Santa Barbara, dat we tegen 3.30 's middags bereiken, opent zich een heerlijk panorama op de vallei van Amána en het daarachter liggende, verre gebergte. Daar onze bestemming voor dien dag de haciende ')

^{1) »}Gij zijt als een landgenoot; gij betaalt niets."

²⁾ Mangifera indica.

³⁾ Tweede ontbijt, lunch.

⁴⁾ Kleedingstuk, het midden houdende tusschen een mantel en een deken, mestel effen blauw en rood van kleur. Een gat in het midden dient om het hoofd door te steken.
5) Plantage.

n José is, houden we slechts eenige oogenblikken stil in het op guasai gelijkende plaatsje. Een paar malen doorwaden we de Amánarier, wier zandige oevers met een heerlijken plantengroei zijn bedekt. Venals die van de Tonóro, bestaan de hooge, steile rotswanden der mana, die zich boven de vlakke oevers verheffen, uit gelen zandsteen. Tegen 5 ure stijg ik af aan het woonhuis der suikerplantage San José, hoewel slechts de haciendera 1) thuis is, word ik, ofschoon zonder nbeveling, met groote voorkomendheid ontvangen. Met dien fijnen tact onverwachtte gevallen aan intelligente vrouwen in alle hemelstreken gen, kwijt de haciendera zich van haar taak als gastvrouw.

Tengevolge van de felle zonnehitte, waaraan ik sedert mijn vertrek uit ledad was blootgesteld geweest, leden zoowel het gedeelte van mijn tus, dat niet door den helmhoed bedekt was, als de rug mijner handen in erythema, hetgeen vooral des nachts een ondragelijke jeukte veroortakte. Met den aanvang van het regenseizoen verminderde allengs de estpassaat, die anders dagelijks verkoeling aanbracht, en thans als zoolnig werd vervangen door afwisselende regenbuien.

Aldus hebben we gedurende de beide volgende dagen de Rio Guarapiche passeerd; het stadje Caicára, met zijn witte kerk en suikerrietvelden, bben we achter ons gelaten; evenzoo de schilderachtige oevers van de uatáta en het dorp San Felix. In de rijke, tusschen de uitloopers der erra gelegen hacienda San Felix, met zijn suikerrietvelden en bananen, noten we een allervriendelijkste ontvangst. De veld- en andere arbeid deze plantage wordt door Indianen, naar het schijnt vooral Cumanatos 2), verricht. Men maalt hier het riet nog op primitieve wijze, door iddel van stroomend water, dat de maalcilinders in beweging brengt; in systeem dat zelfs in Suriname, althans in 1886, bijna tot het verden behoorde.

Den 24sten Maart, in den loop van den ochtend, hebben we het gergte bereikt. Het landschap, hetwelk reeds langzamerhand een ander trakter had gekregen, en in bodemrelief en in plantengroei, niet het inst door de aanwezigheid van talrijke zuilencactussen, bood nu een heel verschillend aanzien van den golvenden *llano*. De smalle paden, e over het kale kalkgesteente voeren, worden ruw en moeielijk. Hier

¹⁾ Bezitster eener hacienda.

²⁾ Over het voorkomen dezer Indianen — tevens toepasselijk op allen, die om en de oostelijke kustsierra wonen, — zie mijn Observations etc., p. 51.

en daar liggen losgeraakte rotsblokken van verschillende afmetingen, everals de enge kloven en scherpe ribben langs de helling der bergen, getuigend van de machtige en langdurige werking des waters. Slechts in die kloven, wier bodem en wanden het langste vochtig blijven na de regenbuien, die gedurende eenige maanden deze anders dorre streken drenken, vindt men welig struikgewas. Overigens ontwaart het oog van den eenzamen reiziger slechts geel gras en talrijke agaven, uit wier midden de reusachtige bloeistengels in de hoogte steken.

Osschoon de vergezichten, die zich nu en dan op hooggelegen punten voordoen, veel bekoorlijks hebben, is het landschap in het algemeen slechts middelmatig schoon.

Kort vóór we in het dal van Guanaguana waren afgedaald, ontmoetten we een talrijken zwerm *langostas* 1), die zich als een dwarrelende sneeuwbui voortbewogen.

Daar de zwerm voor een groot gedeelte uit warm groenachtig gekleurde jonge exemplaren bestond, was hun vlucht onzeker, en stortte een groot gedeelte als een hagelregen neder. Mijn kleederen, zadel en paard waren voor eenige oogenblikken met sprinkhanen bedekt; velen vonden hun dood toen ze met knetterend geluid vermorseld werden onder de hoeven van mijn paard, wien dit onverwachtte stortbad in het minst niet scheen te bevallen.

Reeds bij mijn vaart op de Orinoco, in het midden van dien reusachtigen stroom, had ik talrijke sprinkhanen ontmoet, en mij, door hun menigte, den vernielenden invloed kunnen begrijpen, dien zij bij tijden uitoefenen op den oogst dezer streken. Vandaar dat gebrek, dat bijna chronische hongerlijden, hetwelk ik op vele plaatsen aantrof. Waar de cassave- en matsvelden in Venezuela worden verwoest, dreigt hongersnood, een der zeldzame geesels die, nu en dan, deze overigens zoo zorgelooze bevolking komen teisteren.

Guanaguana, waar we tegen 3 ure 's middags aankomen, ligt zeer be-koorlijk in een wijde vallei, te midden van een rijken plantengroei en vruchtbare conucos 2). We vinden een onderkomen bij den jefe civil, wiens op de onbestraatte plasa liggend huis onmiddellijk grenst aan de oude, onvoltooide kerk, die dagteekent uit den tijd der missies. Ik deel den maaltijd met het gezin van den jefe. Daarna is er muziek; maar hoeveel aantrekkelijks die ook bezit, ik val door de vermoeienis van den

¹⁾ Sprinkhanen.

²⁾ Met nuttige planten (cassave, maïs, bananen, suikerriet, enz.) bedekte stukken gronds.

dag al spoedig in mijn hangmat onder de veranda in slaap. Zoowel wij als onze dieren hadden onze krachten noodig voor den volgenden dag, want we zouden de Cuchilla, de scherpe berggraat, die de dalen van Guanaguana en Caripe scheidt, overtrekken.

25 Maart. — Tegen half 8 breken we weder op. Aanvankelijk leidt het pad door boschages, bouwland en bosch, totdat men, na ongeveer een uur rijdens, het eigenlijke bergpad begint te bestijgen, dat, slecht gebaand, maar desniettemin camino real 1) genaamd, in groote zigzags langs de berghelling en over de berggraat zelf, die uit grauwe kalk bestaat, leidt.

Afwisselend regenbuien. Fraaie vergezichten naar het zuiden, tot ver in de *llanos*, die zich in een nevelachtig verschiet verliezen. In het geheele landschap ligt iets vaals. Is men het hoogste punt²) over, dan is het gras groener, de plantengroei weelderiger en het gebladerte frisscher dan ik tot nog toe in het gebergte heb aangetroffen; ook is er meer water.

Tegen I ure 's middags bereiken we El Guácharo, een kleine casería of huizencomplex, onregelmatig, wijd en zijd in de vallei verspreid. Van daar trekken we een, ongeveer naar het westen verloopend, stijgend dal in, en houden een paar kilometers verder halt aan een woning, die ons is aangewezen.

De eigenaar, Gómez geheeten, ligt vrij ernstig ziek, doch desniettemin vind ik, bij de twee zich in huis bevindende vrouwen, een vriendelijke ontvangst. Volgens hun verlangen bezoek ik den zieke, doch daar men de behandeling, die ik noodig achtte, te herotsch vindt, wendt men liever de zeer twijfelachtige palliatieven aan, voorgeschreven door een soort van Aesculaap, dien men uit Caripe heeft ontboden.

Het huis van Gómez is de laatste woning in dit dal. Zoowel de rijke, oorspronkelijke plantengroei als de welig tierende aanplantingen van koffie en tabak getuigen van de vruchtbaarheid des bodems. Het geheel heeft iets zeer bekoorlijks, en ademt rust en vrede.

Ongeveer ¹/₄ uur gaans van de woning, verder het dal in, bevindt zich de vermaarde grot of Cueva del Guácharo, die het eerst wetenschappelijk onderzocht en beschreven werd door Alexander von Humboldt ³).

Hoewel het te laat was om nog dien dag de grot te bezoeken, kon

l) Koninklijke weg.

²⁾ Volgens Humboldt is de absolute hoogte der Cuchilla 548 toises (= 1,067 M. = 3,288 voet). Voyage aux régions équinoxiales etc., Vol. 8, ed. in 8°.

³⁾ Voyages aux régions équinoxiales, vol. 3.

ik niet nalaten, als 't ware een bedevaart te maken naar een plek die men, in Humboldt's lange reis, welhaast klassiek zou mogen noemen.

Het was een schoone, zeer romantische site. De bijna even hooge als breede ingang der grot 1) in den steilen rotsmuur doet tot op een aanmerkelijken afstand het daglicht in dit reusachtig natuurlijk gewelf schijnen. Het heerlijke groen steekt scherp af bij het grijsachtig gele kalkgesteente van den rotswand; krachtige boomstammen verrijzen, zoowel boven als naast den ingang der Cueva. Onder die boomen siert zich de fraaie too met op lange grijze baarden gelijkende parasieten 2), die wuiven in den wind. Drie houten kruizen, voor de grot nevens elkaar in den grond geplaatst, verhoogen de eenzaamheid van het geheel, en schijnen voor hem, die zich in deze onderaardsche gewelven waagt, een waarschuwend "Memento mori!"

Na een vrij koelen nacht te hebben doorgebracht, bezoek ik den anderen morgen de Cueva. Tot gids diende mij een Mesties; bovendien vergezelde ons Manuel Maria. Nauwelijks is men binnen den ingang der grot, of het oorverdoovend, krijschend geschreeuw der honderden gwacharos 3) naar welken vogel de Cueva is genoemd, begroet u.

Door onze komst verschrikt, hebben velen hun nesten in de trechtervormigen gaten van het rotsgewelf verlaten, en vliegen angstig rond.
Te vergeefs beproef ik er eenigen neder te schieten, doch de schemering
maakt het bijna onmogelijk om juist te mikken. Tallooze vruchten van
de cobalonga 4) en den palmito, waarmede zich de gudcharo voedt, bedekken den grond, tot op een zekeren afstand van den ingang der grot. In
het dikke zand op den bodem bevinden zich talrijke holen van krabben,
terwijl een soort van Grylla zich hier snel over den grond voortbeweegt.
Verder op vinden we talrijke sporen van lapas 5) in het zand.

i) Volgens Humboldt 80×72 voet. De Cueva ligt, naar zijn berekening, 506 toises (= ± 976 M. = 3,086 voet) boven den spiegel der golf van Cariáco.

²⁾ Tillandsia sp.

³⁾ Gudcharo = edie klagend schreeuwt". Een tot de geitemelkers behoorende vogel; Steatornis caripensis van Humboldt.

⁴⁾ Ocotea sp.; een Lauracee.

⁵⁾ Coelogenys paca.

Eindelijk steekt de gids de fakkels aan, die uit bundels gespleten candilo-hout bestaan, en een harsachtige lucht verspreiden.

We dalen nu af in de eigenlijke grot. In vele opzichten werd ik mijn verwachtig teleurgesteld, daar de Cueva del Guácharo zich in algemeen voorkomen, voor zoover ik vergelijkigen kon maken, door niets van andere grotten onderscheidt. In den *Cuarto precioso*, een der fraaiste gedeelten, zijn vele stalactieten en stalagmieten door baldadige bezoekers vernield. Een klein rotsbassin met koud, kristal helder water gevuld, draagt den naam van *Poso* of *Baño* 1) de *Humboldt*. De overlevering zegt, dat hij er zich in baadde en zijn naam — waar ik te vergeefs naar zocht — op den rotswand schreef.

Daar een koel verkwikkend bad in Venezuela een zoo zeldzame weelde voor mij was, liet ik niet na mij, al of niet Humboldt's voorbeeld volgende, bij toortslicht in den *Poso* te baden. Verkwikt en verkoeld, ging ik weder verder, door een eindeloos labyrinth van gangen en gewelven.

Na een poos aarzelend zoeken, verklaart de gids, dat hij verdwaald is. Door zijn zorgeloosheid bleef ons nog slechts éen onaangestoken fakkel over; de andere was half opgebrand. Wat er toen in mij omging, vermag ik niet te beschrijven. Meer dan eens heb ik, op mijn reizen, met volle bewustzijn den dood voor oogen gehad, maar nooit heeft de ijzige kalmte der wanhoop mij zóó overmeesterd als toen. De voorbeelden, dat menschen in de Cueva verdwaalden en nooit terugkeerden, bestaan. Zoo was het dus geen wonder, dat we met de volharding der vertwijfeling een uitweg zochten. Eindelijk na een tijd, die mij, wellicht hoe kort ook, een eeuwigheid toescheen, slaakte de oude Neger een kreet, en raapte het overblijfsel van een opgebrande fakkel op, die door den gids was weggeworpen. We waren op een punt gekomen, dat we vroeger hadden gepasseerd. Thans zochten we ons spoor, hetwelk weldra in een gedeelte leidde, dat den gids bekend was. Hoewel ik de Cueva in haar geheelen omvang niet had gezien, ontbrak mij de moed, mij verder aan zulk een gids toe te vertrouwen, en zocht ik zoo spoedig mogelijk den uitgang.

In den middag van denzelfden dag bracht ik te paard een vluchtig bezoek aan het dorp Caripe, 1¹/₂ rijdens van het dal der Cueva. Een smalle onregelmatige weg voert er heen, en levert schilderachtige punten op, vooral daar waar hij, door weelderigen boschgrond en het ernstig groen van koffieaanplantingen voert. Caripe, in Humboldt's tijd nog een

¹⁾ Put of bad.

27 Maart. — Den vorigen avond was mij door den gids een levenden gudcharo gebracht, dien hij, wetende dat ik er een wenschte machtig te worden, in de grot, na ons bezoek, met een langen staak had neergestoten. Mijn eerste werk was des ochtends de huid van den vogel te prepareeren, weinig vermoedende, dat die later, niettegenstaande mijn voorzorgen, door mieren zou worden vernield.

Tegen 10.30 's morgens zetten we de reis voort. Behalve een kort oponthoud in de nabijzijnde caseria, om wat proviand te koopen en, met
den voet in den stijgbeugel, een haastig almuerzo te gebruiken, hielden
we ons niet op, alvorens we San Antonio bereikten. De weg, of liever
het slecht gebaande muilezelpad, niet beter dan een Saumpfad in de Alpen, maar dat men desniettemin, zoo pompeus mogelijk, met den naam
van camino real bestempelt, leidt aanvankelijk over bergweiden. Later,
nadat het door een langen pas gevoerd heeft, weder afwisselend door
hoogweiden en boschrijke ravijnen. Een sieraad der valleien van de kustcordillera is de bucare 1), met witachtigen stam en koraalroode bloesems.

Het was ruim 3 ure toen ik San Francisco, een klein nest, bereikte. Verder gaat het weder: over den bodem van het bekoorlijke, lachende dal; langs en over de sterk kronkelende Rio Colorado; langs rijke conucos en door velden van hoog riet.

Bij half 6 reed ik San Antonio binnen, en daar mijn arriero²) met de ezels ver in de achterhoede was geraakt, zoodat ik niet wist, waar we een onderkomen zouden zoeken, richtte ik mij zonder verwijl tot den gemeente-secretaris. Dank zij den officieëlen aanbevelingsbrief aan alle ambtenaren en militairen der republiek, dien mij de gouverneur van den staat Guyana te Bolívar had verstrekt, vond ik spoedig een onderkomen.

San Antonio bestaat uit een enkele lange straat. De oude kerk, in renaissancestijl, dagteekenend uit 1794, staat afzonderlijk op een ruime plaats, en komt allerschilderachtigst uit tegen het donker bewassen gebergte. In de kerk bevinden zich eenige schilderijen uit het begin dezer eeuw. Het zijn Bijbelsche voorstellingen, en stukken zonder artistieke waarde.

¹⁾ Erythrina sp., in Suriname koffiemama geheeten.

²⁾ Ezeldrijver.

Om Cumanacóa te bereiken, moesten we 's anderen daags, te 8.30 opbrekende, tot Cocollar 1) een, zelfs voor Venezuela, zeer slecht, ruw bergpad overtrekken. Zeer terecht noemde Manuel Maria dit gedeelte van den "koninklijken weg" muy malúco 1), maar desniettegenstaande kwamen we er overheen, en bereikten het hoogste punt van onze reis.

Bij Cocollar verheft zich het massief der oostelijke kustsierra tot zijn maximum in den Turumiquire, den breed geflankten, machtigen berg, wiens hoogte Humboldt op 707 toises 3) schatte. De zon brengt, door de vrij zwaar bewolkte lucht heen, een heerlijke verlichting op het schoone landschap te weeg; de uitgestrekte wolkschaduwen verhoogen den statigen ernst, die over deze stille bergen en dalen licht uitgespreid.

Over de kale rotsen van glimmerlei en grauwe kalk rijdende, is het mij dikwijls uiterst moeielijk den camino real te vinden, daar, zooals gewoonlijk, mijn gids en ezeldrijver in de verre achterhoede is.

De arme burros wier wonde rug door de drukkende pakzadels iederen dag verergerde, hadden het zwaar te verantwoorden. Meer dan eens stortte er een neder met de lading, of bleef vastgeklemd tusschen de rotswanden van een engen doortocht.

Al regende het ook, zooals dagelijks, "Caramba, burro p'alante!" 4) en stokslagen op de ongelukkige dieren, sneller dan het terrein toeliet, kwamen ze toch niet voorwaarts. Ik was dan ook gewoonlijk ver in de voorhoede, en baarde daarom des te meer opzien onder de weinige bergbewoners, Mestiezen of Indianen, die ik tegen kwam, of in de dorpjes die ik doortrok. Ik werd gewoonlijk gehouden voor iemand, die pardsitas 5) verzamelde, daar er een vrij levendige uitvoerhandel van deze planten tusschen Venezuela en Europa bestaat, en niet zelden orchideënverzamelaars de sierras doorzoeken. 6) Enkele malen ontmoette ik hier en daar lieden wier onmiskenbare galgentronies maar al te zeer verrieden, hoe gaarne zij mij zouden hebben uitgeplunderd, als zij daarbij niets in de waagschaal hadden gesteld. Gelukkig voor mij wisten ze niet, dat de

¹⁾ Wordt uitgesproken Cocoyal. De Venezolanen hebben de gewoonte, de gemouilleerde \mathcal{U} als y uit te spreken, en l en r zeer dikwijls te verwisselen. Vooral op het einde van woorden is dit het geval.

²⁾ Zeer slecht.

³⁾ Ruim 1371 M. = 4,242 voet.

⁴⁾ Vervloekt, ezel vooruit!

⁵⁾ Orchideën.

⁶⁾ O. a. bezocht de botanicus Moritz dit kustgebergte, en besteeg, evenals Humboldt, den Turumiquire.

zware Engelsche revolver, die aan mijn zijde hing, ongeladen was; want patronen had ik niet meer, en het kaliber dat ik noodig had, was nergens te krijgen.

Is men den hoogsten pas eens over, dan daalt het bergpad spoedig onder een zeer sterke helling. Weldra komt men op vlak terrein en vervolgt het spoor door boschland en carrisales 1), langs suikerrietvelden en conucos; hier en daar bevinden zich talrijke boschages van op Noord Amerikaansche mesquites gelijkende mimosaceen.

Tegen half 6 's avonds rijd ik Aricagua door, een dorp, 't behoeft nauwelijks vermeld, dat weder een oude vervallen kerk bezit. Een half uur later heb ik Cumanacóa bereikt. Daar het Zondag is, zijn de zandige straten vol menschen, en word ik sterk aangegaapt. Bij een winkelier met een Italiaanschen naam, aan wien ik ben aanbevolen, vind ik een nachtverblijf, dat minder armoedig dan gewoonlijk is.

Cumanacóa is de aanzienlijkste plaats sedert ik Ciudad Bolivar verlaten heb. Het ligt op een hoogte van 104 toises ²) boven den zeespiegel, in een ruime bekoorlijke vallei, eens de bodem van een nu verdwenen meer, en door steile bergwanden omgeven. Van uit het zuiden ontwaart het oog den Turumiquire, nu in nevelen gehuld. Allerwege in den omtrek strekken zich bloeiende conucos uit, waarin mats, suikerriet en tabak.

De kleine, dicht naast elkander liggende pueblos Arenas en San Fernando, beide eenmaal missies, zijn de eerste plaatsen, die men door komt op weg naar Cumaná. Terwijl vooral San Fernando thans vervallen en zeer onbeduidend is, heeft Arenas nog dit op zijn buurman voor, dat het in Humboldt's tijd een mannelijken bewoner bezat, die zelf zijn kinderen zoogde. Nadat men San Fernando verlaten heeft, leidt de weg weder spoedig in de hoogte. Tot Barranquin in het een bijna aanhoudend steigen. Het pad is bij uitstek slecht, hier en daar is de bodem, die oogenschijnlijk uit rooden zandsteen bestaat, zóó glad, dat mijn paard herhaaldelijk neerstort, en ik moet afstijgen. Aan de linkerkand bruist de snelvlietende Manzanares, over groote blokken kalk- en zandsteen, die de bedding versperren. Het struikgewas is veelal dor, en smacht, aan het einde van den drogen tijd, naar regen. Het dierenleven is hier, ten minste voor het oog van den doortrekkenden reiziger, evenzoo arm als elders in deze sierra.

Een drukkende, zwoele, schier ondragelijke hitte, die mij en mijn

¹⁾ Met hoog riet bewassen stukken grond.

²⁾ Ruim 202 M. = 624 voet.

paard in zweet doet baden, gevoegd bij de moeielijkheid van den weg, naakte dezen rid tot een der onaangenaamsten van den geheelen tocht.

Eenige kilometers alvorens Barranquin te bereiken, had ik "thalassa, thalassa!" kunnen uitroepen, want eindelijk, daar, naar het noorden en boordoosten, strekte zich de zee uit.

chter de ultramarijne waterspiegel der golf van Cariáco, naar het noorden begrensd door het schiereiland Aráya. De kale, steile kalkbergen van Aráya schijnen bijna geheel wit, en door het diepe blauw van de golf en door het azuur van den strakken, gloeienden hemel. Aan den verren horizont smelten zee en lucht in een grijsachtig-violet waas ineen, het penseel van een Turner waardig. Maar het hooge eiland Margarita en de kleine eilandjes er om heen vertoonen toch volkomen duidelijk hun bergachtige omtrekken. De aanblik is tooverachtig, onvergetelijk schoon, en beloont alléén de vermoeienissen van den dag.

Spoedig daarop heb ik Barranquin bereikt. Het ligt op het punt, waar de laatste groote daling van den weg naar zee begint, en bestaat uit slechts enkele huizen. Daaronder is een soort van karavanserai, gehouden door een individu, onaangenaam van voorkomen en manieren. Reeds vroeger gedacht ik dien gastheer 1).

Zooals ik, met het oog op de schier uitgeputte burros en het moeielijke pad, verwachtte, kwam de Neger eerst vele uren na mij in de caseria aan. We brachten een slapeloozen, onaangenamen nacht door, wegens de luidruchtige reizigers, meestal doortrekkende arrieros, die met drinken en spelen den tijd verkortten.

30 Maart. — Tegen 6.30 leggen we den laatsten rid af. Het grootste gedeelte van den weg daalt; het overige leidt door zandig land, dat met zuilencactussen, tunas en schraal struikgewas bedekt is. Dikwijls word ik aan het landschap van Beneden Californië herinnerd; evenzoo ging het mij eenige dagen later op het schiereiland Aráya.

Evenals den vorigen dag ontmoeten we eenige Caraïben-Indianen, die van Cumaná komen. Zij gelijken volkomen op die, welke ik bij Rio Tigre en Aguasai had ontmoet. Ruim vier uren na het verlaten van Barranquin bereiken we Cumaná.

Cumaná is een ville morte bij uitnemendheid. Indien Humboldt bij

¹⁾ Een en ander over Suriname. De Gids, Aug. 1888.

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Een met zout geladen schoener nam mij kort daarop te Araya aan boord, en zette koers naar het westen. De hooge bergtop van den Bergantin bleef nog lang in het gezicht, als een laatste baken op de kust, die ik verliet.

Twee dagen later liet de "Maria Isabel" te La Guaira het anker vallen.

Montpellier, Dec. '89.

DE VERMEERDERING DER KENNIS VAN DEN AARDBOL GEDURENDE HET JAAR 1889

DOOR

J. Æ. C. A. TIMMERMAN.

Secretaris van het Koninklijk Nederlandsch Aardrijkskundig Genootschap.

(Vervolg en slot.)

NIEUW-GUINEA.

Het overzicht betreffende Nieuw-Guinea kan verdeeld worden in drie gedeelten, nl. de reizen en onderzoekingen in het Duitsche, het Engelsche en het Nederlandsche gebied. Door het laatstgenoemde komen wij dan geleidelijk tot de bespreking onzer Oost-Indische kolonien 1), terwijl het overzicht van Duitsch Nieuw-Guinea aansluit bij datgene wat reeds in het eerste gedeelte van dit opstel (p. 440) is medegedeeld aangaande het onderzoek van den Archipel van Nieuw-Britannie (door de Duitschers Bismarck-Archipel genoemd). Om die reden begin ik met het Duitsche gebied op Nieuw-Guinea, om te eindigen met het Nederlandsche 1)

Vooreerst hebben wij daar de in het laatst van 1888 gedane reis van Dr. Hugo Zöller, den onderzoeker van het binnenland van Togo. In gezelschap van drie ambtenaren der "Neuguinea-Kompanie" (Dr. Hellwig, Winter en Yelliot) trok hij van Constantinhafen naar het Finistre-gebergte, tot eene hoogte van 2660 m.; de Mount Gladstone is nog too m. hooger. Eene nieuwe, ca. 3000 m. hooge keten, tusschen het Inisterre- en het Bismarck-gebergte werd, naar den "Landeshauptmann"

¹⁾ In dat plan is in zooverre wijziging gekomen dat Prof. Kan het overzicht voor ederlandsch Indië bewerkt heeft. Zie p. 543 van deze aflevering.

van dezen naam, Kratkeketen genoemd 1). Verder heb ik te vermelden de reis van Dr. Hellwig, in Januari 1889, van Finschhafen naar den 970 m. hoogen Sattelberg. Dr. Schrader heeft de route ingeteekend op zijne kaart 2) der omgeving van Finschhafen (sch. 1:75,000), terwijl Freih. Von Schleinitz eene kustopneming 3) heeft gedaan van de noordkust van Kaiser Wilhelms-Land, van af Kaap Cretin bij Finschhafen tot de Legoarant-eilanden bij Hatzfeldthafen (sch. 1:500,000); ten slotte publiceerde Schrader, op grond der in 1886 en '87 gedane opneming van de Kaiserin Augusta-rivier, de thans voorgoed vastgestelde kaart daarvan 4).

Over Britsch Nieuw-Guinea zijn vooreerst reizen te vermelden welke reeds in vroegere jaren plaats hebben gehad en waarvan thans de uitkomsten meer in bijzonderheden bekend zijn geworden, zooals die van Bevan⁵) en Forbes⁶). Was laatstgenoemde indertijd niet gelukkig in zijne poging om het Owen Stanley-gebergte over te trekken, het is thans aan Mac Gregor gelukt dat gebergte geheel te onderzoeken. De hoogste top werd door hem Mount Victoria (4000 m.) genoemd, terwijl ten N. van de hoofdketen een nieuwe berg de Mount Albert Edward (3810 m.) werd ontdekt⁷). De onderzoekingen van Bevan in de Jubilaeumrivier zijn in 1888 voortgezet door kapitein J. M. Hennesy⁸).

Een algemeen overzicht der reizen, welke gedurende de laatste twaalf jaren in Britsch Nieuw-Guinea gedaan zijn, geeft Guido Cora in Cosmos ⁹).

Afgesloten op het eind van April.

AZIË.

Over de Philippijnen zijn enkele tijdschriftartikelen te vermelden, nl.

¹⁾ PM. 1889, p. 55 en 104. Köln. Zeitg. 17 Jan., Febr. en Maart 1889; Nachr. Kaiser Wilhelms-Land 1889, p. 3, met kaart p. 15.

Zöller heeft ook deelgenomen aan eene inspectie-reis van Krätke naar de Salomonseilanden.

²⁾ PM. 1889, p. 208. Nachr. K. Wilh.-Land '89, p. 40.

³⁾ lb. p. 208 en lb. p. 47-87.

⁴⁾ Ib. p. 208 en Zeitschr. Ges. f. Erdk., Berlin 1889, no. 2 en 8.

⁵⁾ Zie TAG. 1888, M. p. 240 en 424 vlg. PM. '89, p. 55. Proc. '89, p. 82.

⁶⁾ PM. '89, p. 55. TAG, '88, M. p. 240.

⁷⁾ PM. '89, p. 208.

⁸⁾ PM. '89, p. 280. Proc. R. G. Soc. Australasia, Queensl. Br. 1889, III, p. 64.

⁹⁾ G. Cora, Esplorazioni nella Nuova Guinea Britannica negli ultimi dodici enti (Cosmos 1889, X, p. 7-19).

van Marche, Steere, Taylor, d'Hane-Steenhuyse en hadenberg 1).

Marche, wiens beschrijving der eilanden Luzon en Palawan in den rigen jaargang (M. p. 383) door ons werd vermeld, geeft mededeelingen er de natuurlijke gesteldheid en de bevolking der beide eilandenreeksen, like zich uitstrekken van het Noordoosten van Borneo naar Luzon en indanao. Na de beschrijving der flora van de Philippijnen door Rolfe e den vorigen jaargang M. p. 383), hebben wij thans die der fauna or Steere, die den archipel, naar de dierenwereld, in zes gebieden rdeelt.

Taylor's beknopte beschrijving is eene compilatie welke hoofdzakelijk rust op artikelen in verschillende tijdschriften. Behalve de hier opgevene publicaties vindt men, in PML. '90, n°. 113—117, nog eenige els van opstellen in Spaansche tijdschriften.

Onder de grootere werken over Japan zij hier vooreerst de aandacht vestigd op de geologische opnemingen, welke sinds 1880, onder leiding m Dr. Naumann, in vollen gang zijn 2) en waarvan thans eenige kaarten nuitgegeven 3); er is eene afzonderlijke agronomische kaart, welke der leiding van Dr. Fesca (vergel. p. 384 van den vorigen jaargang) vervaardigd. Ook hier vindt men het verschijnsel dat sommige cultures, et name in de provincie Kai, gebonden zijn aan bepaalde grondsoorten; o gedijt de moerbezieboom het best op graniet; rijst en katoen komen

¹⁾ A. Marche, Rapports sur l'île de Paragua (Palawan), sur l'archipel des Camianes et sur l'île de Bongao (archipel de Islo). Arch. des miss. scient. 3 Sér. XIV, 38, p. 351-390. (Ref. van Partsch, PML. 1889, n°. 915).

J. B. Steere, The Philippine Islands. Nature 1888, XXXIX, p. 37 vlg. (Ref. Supan, no. 916).

W. A. Taylor, The Philippine Islands. Sc. G. Mag. 1889, p. 81-90.

Ch. d'Hane-Steenhuyse, Les archipels des îles Philippines. Bull. Soc. R. lge de géogr. 1888, p. 469, met kaart.

A. Schadenberg, Beiträge zur Ethnographie von Nord-Luzon. Mitt. Anthr. Ges. lien 1888, XVIII, p. 265-27!.

²⁾ Zie PM. 1884, p. 23. Die Kaiserlich-japanische geologische Reichsanstalt nach ren bisherigen Arbeiten. Von Dr. Naumann, Direktor der Anstalt.

³⁾ Geological Survey of Japan. Reconnaissance Map (Dai Nippon Yosatuuzu) in 1400,000, 1886 en 1887. Sectional Map (Dai Nippon Kei-isen Kubunzu) in 1:200,000, kio 1884—1888. Agronomic Map in 1:100,000, Kai, met toelichting van Prof. 1887. Oost-Shimotsuke 1888. Sagami en Zuid-Musashi 1888. Bij de twee laatsteemde bladen en bij de beide eerstgenoemde is de toelichting in het Japansch. ie het uitgebreid referaat van Gottsche, PML. 1890, n°. 13).

op oudquartaire gesteenten voor; indigocultuur heest men op alluvisigenden. Gottsche betreurt het, in zijn reseraat, dat de tekst bij de kaarten niet in eene andere taal dan het Japansch is geschreven, daar men in het buitenland geen tijd heest om zich met de studie dier taal bezig te houden.

Een ander werk van geologischen aard is het overzicht der geoteke tonische gesteldheid van de Japansche eilanden, door Harada 1); evenzoe de beschrijving der merkwaardige uitbarsting van den Bandai-San in Juli 1888, door Wada²). Deze vulkaan, gelegen op 37° 36' N.B. en bestaande uit drie toppen, de O-bandai (1840 m.), Kobandai en Kushigamine, was reeds eeuwen lang in rust geweest. In eene reisbeschrijving van 1687 wordt nog gesproken over eene helder verlichte rookzuil die uit den krater zou zijn opgestegen, maar overigens waren eenige zwavelbronnen van 65° C. de eenige bewijzen eener vroegere vulkanische werking. De uitbarsting op 15 Juli duurde twee uren; de Kobandai werd geheel uit elkander geslagen en in een diepen krater veranderd; er kwam geen lava uit den vulkaan, maar wel asch, slijk en veel water, terwijl rotsblokken van millioenen centenaars werden weggeslingerd. Eene oppervlakte van 6 à 7 duizend hectaren werd onder de asch bedolven; de uitgeworpen massa van augietandesiet wordt geschat op een gewicht van 30,520 millioen ton (van 1000 kilogr.).

Ook de seismologische waarnemingen in Japan worden geregeld voortgezet, getuige het artikel van Milne³), dien ik ook in mijn vorig overzicht (p. 383 en 384) genoemd heb.

Van meer algemeenen aard zijn de werken van Labroue, Goudareau, Dickson, Whitney, Mayet, Appert en Kinoshita 4).

¹⁾ T. Harada, Versuch einer geotektonischen Gliederung der japanischen Insela. 8°, 23 pp. Tokio 1888. (Ref. als boven, n°. 14).

²⁾ T. Wada, Der Ausbruch des Bandai-San im Juli 1888. Mitt. Deutsche Ges. f. Ostasien. Tokio 1889, V, p. 69—74, met 7 afbeeldingen en eene kaart 1:50,000. (Ref. van Supan in PML. '89, n°. 2884).

³⁾ J. Milne, Seismological work in Japan. Nature, 31 Oct. 1889, XL, p. 656-658.

⁴⁾ E. Labroue, L'empire du Japon, 40 en 327 pp., met kaart. Limoges, Barbou 1889. (Aankondiging in Bull. Soc. géogr. comm. de Bordeaux 1889, p. 383).

G. Goudareau, Excursions au Japon. 4°, 317 pp., Paris, Picard et Kaan 1889. Pr. 7 fr. (Aankondiging in Bull. Soc. géogr. Marseille 1889, p. 419).

W. G. Dickson, Gleanings from Japan. 8°, 400 pp., London, Blackwood 1889. Pr. 16 sh. (Aankondiging in Proc. 1889, p. 393; Sc. G. Mag. 1889, p. 386; Athenaeum 20 Juli 1889, p. 86; Academy 8 Juni 1889, p. 390).

pickson heeft verschillende gedeelten van Japan bezocht en beschrijft de egen, de manier van reizen, het voorkomen des lands, terwijl hij allerlei ijzonderheden en wetenswaardigheden daarbij ten beste geeft. Al is zijn berk niet streng geographisch en wetenschappelijk, het bevat toch vele belangrijke gegevens voor de kennis van het land. Whitney daarentegen, tie als tolk der Amerikaansche legatie langen tijd in Tokio gewoond heeft, gaf een arbeid van statistischen aard in het licht, berustende op de publicaties van het Statistisch Bureau, beteffende de volkstellingen van 31 Dec. 1886 en 31 Dec. '87, alsmede op het officieele "Résumé statissique de l'empire du Japon", van Maart 1889, de mededeelingen van het Topographisch Bureau en der directie van het verkeerswezen, en eindelijk op de gegevens in den Japanschen postalmanak. De schrijver geeft o.a. 123 steden op met meer dan 10,000 inwoners en daaronder de volgende zes, die volgens de telling van 1887, meer dan 100,000 inwoners hebben: Tokio 1,165,048, Ozaka 432,005, Kioto 264,559, Nagoya 149,756, Jokohama 115,012 en Kobe 103,969. De lengte der spoorwegen bedroeg in 1889, 1374 km., terwijl er 1300 km. in aanleg zijn. Ter vergelijking deelt Gottsche daarbij mede, dat er in 1885 nog slechts 347 km. waren; de vooruitgang is dus aanzienlijk. Onder de verdere belangrijke mededeelingen in Whitney's werk, zij hier nog de aandacht gevestigd op de decreten, volgens welke, van af 1 Januari 1890, de staatsregeling wordt ingericht, o. a. de bepalingen betreffende de volksvertegenwoordiging door twee kamers. — De oppervlakte van het rijk bedraagt 382,421 qkm., de bevolking 39,069,007 zielen (31 Dec. 1887). Vergelijk ook mijn vorig overzicht p. 383 en 384.

Het werk van Mayet is, zooals ook uit den titel is af te leiden, van staathuishoudkundigen aard; van belang zijn o.a. de opgaven aangaande de kolonisatie van de Hokkaido (het eiland Jezo), waaruit blijkt dat genoemd eiland 616,938 hect. ter bebouwing geschikte gronden heeft, van welke in 1878—'79, 160,470 als bouwland in gebruik waren. Mayet doet

W. N. Whitney, A concise dictionary of the principal roads, chief towns and villages of Japan, with Population, Post Offices etc. 8°, 148 pp., London, Trübner 1889. (Aankondiging in Proc. 1889, p. 393; uitgebreid refer. van Gottsche in PML. 1890, n°. 17).

P. Mayet, Landwirtschaftliche Versicherung in organischer Verbindung mit Sparkauen, Bodenkredit und Schulden-Ablösung. 8°, 449 pp., Tokio 1888. (Ref. van Rein, PML '90, n°. 16).

G. Appert et H. Kinoshita, Ancien Japon. 12°, 254 pp., Paris, Maisonneuve, 1889. Pr. 15 fr.

ook maatregelen aan de hand om Jezo, meer dan tot nu toe het geval is, door Japanners te doen koloniseeren.

De regeering heeft zich daartoe, al sinds jaren, veel moeite en geldes lijke opofferingen getroost; zoo vindt men, als bewijs daarvan, melding gemaakt van eene reis welke de ingenieur C. S. Meik, in 1887 om Jezo gedaan heeft, met het doel om geschikte punten voor den aanleg van havens te zoeken, waardoor men de ontwikkeling van het eiland wil bevorderen. Behalve topographische opnemingen heeft Meik ook onderzoekingen gedaan betreffende het klimaat en de hulpbronnen des lands, dat groote wouden heeft en dat voor paardenteelt en veehouderij geschikt is 1).

Eene opgave der talrijke tijdschriftartikelen over Japan vindt men in PML. 1889, n°. 731—740, 2883—2891 en 1890, n°. 15.

In China hebben Dr. Merzen Dr. Groot, in het laatst van 1888, eene reis gedaan door de provincies Fo-kiën en Kiang-si²). Van Amoy gingen zij langs de Chiu-lang-chiang naar de Min-rivier, die zij opwaarts volgden. Daarna trokken zij over de waterscheiding dier rivier met de Jang-tse-kiang, naar Lung-hu-shan en vervolgens naar het Pojang-meer en de verdragshaven Kiu-kiang; de provincie Fokiën is, daar waar zij haar doorgetrokken zijn, zeer dicht bevolkt.

De provincie Kansoe werd beschreven door G. von Kreitner, die aan de expeditie van graaf Széchényi heeft deelgenomen; hij komt zeer bepaald op tegen de bewering van den abt Larrieu³), als zoude daar geen Chineesche muur zijn. Volgens hem bestaat de muur in de provincie Kansoe uit leem en heeft zij eene hoogte van 3—4 m. en eene breedte van τ m. ⁴).

Gelijk den lezers bekend zal zijn heeft de Hwang-ho, den 22sten Juli 1889, opnieuw eene geweldige doorbraak, ter breedte van 730 m., in zijn rechteroever gemaakt en zich een weg gebaand naar een punt dat 65 km. ten Z. O. van de tegenwoordige monding ligt ⁵).

¹⁾ PM. 1889, p. 28. — Trans. As. Soc. of Japan, XVI, p. 151-173. C. S. Meik, Around the Hokkaido.

Vgl. ook: G. Appert, L'île d'Yëzo; un essai de colonisation japonaise. Rev. géog. 1889, XXV, p. 16-26; 95-107.

²⁾ PM. '89, p. 28. — ZGEB. 1888, p. 401. Merz, Bericht über seine erste Ries von Amoy nach Kiu-Kiang.

³⁾ TAG. 1887, M. p. 469. — PML. 1887, nº. 534. — Vgl. ook de mededeeling van den heer F. G. Kramp, in de vorige aflevering van ons tijdschrift, p. 452.

⁴⁾ PM. '89, p. 182. G. von Kreitner, Die Chinesische Provinz Kansu. Mit. Deutsche Ges. Ostasien '88, IV, p. 399—410. Met kaart 1:4,500,000.

⁵⁾ PM. '89, p. 181 en 278.

De grootere werken over China zijn ditmaal niet talrijk; er zijn hoofdkelijk tijdschriftartikelen en brochures (PML. '89, n°. 743-760, 2892-11). Een reisverhaal is dat van Percival, die van Shanghai tochten est gemaakt naar het gebied aan de boven Jangtse-kiang 1). De zendeg Pourias heeft vroeger (1881), in de "Missions Catholiques", eenige ededeelingen gedaan, aangaande zijne werkzaamheid in Junnan, welke ans, na zijn dood, afzonderlijk zijn uitgegeven 3); in de inleiding van t werk wordt eene beknopte geographische beschrijving der provincie geven. De rijkdom aan steenkool, tin, zink, koper, zilver en kwikzilr moet zeer groot zijn; er komen veel heete bronnen voor; het land is er vruchtbaar in granen, rijst, oost enz. Eveneens op het zendingswerk China heeft het werk van Antonini betrekking, waarin ook de zen en gebruiken der bevolking beschreven worden 3). Ten slotte zij nog elding gemaakt van twee werken over de beroemde porcelein-industrie n China in vroegeren tijd, nl. die van Hirth en Meyer⁴), welke oral ook van gewicht zijn voor de kennis der handelsbetrekkingen van nina met de landen van het Westen, in de Middeleeuwen; met name l door Arabieren bewoonde landen.

Over Formosa heeft de zendeling Campbell een uitvoerig werk het ht doen zien ⁵), dat wel is waar hoofdzakelijk betrekking heeft op zijne rsoonlijke ondervindingen en ervaringen, maar dat tevens belang heeft gens de vele mededeelingen aangaande land en volk van het in vele zichten nog zoo weinig bekende eiland; terwijl het werk, ook uit een torisch oogpunt, onze belangstelling verdient omdat de werkzaamheid Hollandsche zendelingen in de 17de eeuw daarin wordt beschreven,

⁾ W. Spencer Percival, The Land of the Dragon. London, Hurst & Blackett, 9. 8°, VII en 338 pp., met kaart. Pr. 12 sh. (Aankondiging Proc. '89, p. 512).

Pourias, La Chine. Huit ans au Yunnan. 8°, 188 pp. Met kaart en afbeeldingen. le, Desclée, de Brouwer & Cie., 1888. (Ref. van Weyhe, PML. '89, n°. 741).

⁾ P. Antonini, Au pays de Chine; Le Pays de Chine; Ses habitants, moeurs, ges, institutions; L'oeuvre du catholicisme; Persécuteurs et martyrs. 8°, 301 pp. is, Bloud et Barral, 1888.

⁾ F. Hirth, Ancient Porcelain: a Study in Chinese mediaeval Industry and Trade. 80 pp. Leipzig, München, G. Hirth 1888. (Ref. van Supan. PML. '89, n°. 757).

A. B. Meyer, Lung-ch'üun-yao oder Altes Seladon-Porzellan, nebst einem Anhange r damit in Verbindung stehende Fragen. Berlin, Friedländer & S. 1889. (Ref. van th, no: 2909).

Rev. W., F. R. G. S. Campbell, An account of missionary success in the island Formosa, published in London 1650 and now reprinted with copious appendices. Idon, Trübner & Co., 1889. (Uitvoerig refer. van Grundemann, PML '89, no. 2913).

op grond der oorspronkelijke, in het Hollandsch geschreven, bescheiden Over de bevolking van Formosa worden eveneens mededeelingen daan door Taylor1), die de oorspronkelijke bewoners in vier groepe verdeelt: 1. De Paiwans, waarschijnlijk de oudste bevolking, in de 🚥 toegankelijke gebergten van het binnenland; het zijn allen koppensnellen 2. De Tipuns, die later in het land gekomen zijn, hetgeen ook uit hunne overleveringen blijkt; zij zijn iets kleiner van gestalte en minder wild van aard dan de Paiwans; landbouw, jacht en vischvangst vormen de midde len van bestaan. 3. De Amias worden door de Chineezen en andere vreemden als inboorlingen beschouwd, maar de overige eilandbewoners beschouwen hen niet als zoodanig. Volgens een hunner overleveringen zouden zij de afstammelingen zijn van de bemanning van een groot schip dat op de kust gestrand was. De schipbreukelingen mochten zich op het eiland vestigen en met inlandsche vrouwen huwen, mits zij en hunne afstammelingen als een vreemden stam beschouwd zouden worden, die tot de overige bevolking in zekere betrekking van afhankelijkheid zou staan. 4. De Pepohoans zijn vermoedelijk van de Loe-Tsjoe eilanden afkomstig en tegenwoordig, door vermenging, bijna geheel Chineezen geworden.

De reizen in Mongolië, Tibet en de westelijk daarvan gelegen streken mogen hier eene plaats vinden, daar die landen nagenoeg geheel tot het Chineesche rijk gerekend kunnen worden.

Vooreerst hebben wij de reis van N. Jadrintsef naar Transbaikaliëen het daaraan grenzende Gobi-gebied, in den zomer van 1889; zijn doel was de oorzaken na te gaan, waardoor die in vroegere eeuwen zoo goed bebouwde streken, thans geheel verlaten zijn. Hij is van meening dat de stad Karakoroem, waar Dsjengis-Khan eenmaal zijn zetel had, niet daar heeft gelegen, waar zij gewoonlijk op de kaarten wordt geteekend, daar hij overblijfselen van paleizen en van baden heeft gevonden bij de warme bronnen aan de Dsjementai 2).

Dan zijn er de talrijke expedities, welke ten doel hebben gehad Tibet te bereiken, nl. die van Notowitsj, Troll, Martin, Rockhill en Pjeftsof.

Het plan van Notowitsj was, over den Pamir en door Oost-Toerkestan naar Lhasa te gaan, en na van daar een tocht naar Sikkim gedaan te hebben, langs het Lob-nor terug te keeren 3).

¹⁾ Formosa: Characteristic Traits of the Island and its Aboriginal Inhabitants. By George Taylor, Proc. 1889, p. 224—239. (Ref. v. Supan, nº. 2912).

²⁾ PM. 1889, p. 228; '90, p. 134. — Petersb. Zeit. 1890, 23 Febr./7 Maart.

³⁾ PM. '89, p. 28.

Dok Dr. Jos. Troll, een Oostenrijker, wilde van het W. naar Tibet zen; over Tasjkent, Margelan, Osj en Kasjgar trok hij in 1888 naar otan. In het begin van Mei 1889 verliet hij Jarkand om, na den Katoroempas, in den Himalaja, overgegaan te zijn, in Juni Ladak te beken 1).

De bekende onderzoeker van het Stanowoi-gebergte, de Fransche ingetur J. Martin²), is van uit Peking naar Tibet getrokken, dat hij van zijde van het Koekoe-noor bereiken wil.

De Amerikaan W. W. Rockhill is, in Februari 1889, bij het klooster bemboem, ten Z. O. van Koekoe-noor, aangekomen, vanwaar hij naar saidam en Lhasa wilde. Toen hij, na de passen over den Kwen-loen derzocht te hebben, den tocht naar laatstgenoemde stad wilde aanvaarm, vernam hij dat daar reeds eene Russische expeditie aangekomen was, odat hij besloot door oostelijk Tibet over Tsjamdo, Batang en Litang ar China terug 'te keeren, waarbij hij, gedeeltelijk de route van den indiet A—K volgende, langs de bronmeren der Hwang-ho trok 3). Operkelijk is het hoeveel verwarring met de schrijfwijze der namen er weer bor den dag is gekomen, vooral door de groote verschillen in spelling isschen A—K en Rockhill, die ook heel wat aanmerkingen heeft op rzjewalski. Deze zou o. a. eene zeer onvolledige beschrijving van de longolen van Tsaidam hebben gegeven, welke naar Rockhill's gevoelen, in zeer belangwekkend volk zijn.

Over de Russische expeditie van Pjestsof, den opvolger van Przjewalti 4), valt het volgende te berichten.

Van de stad Przjewalski (vroeger Karakol geheeten, waar Pr. gestorven) trok men over Aksoe en Oetsj-Toerfan naar Jarkand, terwijl de geo-

¹⁾ PM. 1889, p. 101 en 229.

²⁾ TAG. 1887, M. p. 346. — PM. '89, p. 101 en 277.

³⁾ PM. '89, p. 277; '90, p. 58. — Ostasiat. Lloyd, 11 Oct. '89. — Proc. '89, p. 80—85. Mr. Rockhill's attempt to reach Lhassa.

De bekende reiziger Bonvalot is, als begeleider van Prins Hendrik van Prieans, bezig een grooten tocht te doen dwars door Azië over Omsk, Semipalatinsk, seeldsja, Joeldoes, Tarim, het Lob-noor, Tsaidam, het brongebied der Jangtse-kiaug, siamdo, Batang, Junan-foe en Tonkin. Den 10den Oct. '89 waren zij aan het Bagtsj-koel, op weg naar het Lob-noor. Het laatste gedeelte hunner reis zal, voor een root deel, samenvallen met de routes van A—K en Rockhill. PM. 1889, p. 278; '90, 58. — C. R. 1889, p. 386. Bonvalot heeft inmiddels een werk uitgegeven over ijne reizen, onder den titel: Du Caucase aux Indes à travers le Pamir. 4°, XII, 58 pp. Paris, Plon, 1889. (Ref. van Lullies in PML. 1890, n°. 11).

^{· 4)} TAG. 1889, M. p. 888.

loog Bogdanowitsj, toen men over den Tjan-Sjan was, een tocht maakte naar het Tsjatyr-koel, Kasjgar en het met gletschers bedekte gebergte Moestag-ata, waarna hij zich in Jarkand weder met de expeditie vereenigde. Den 13den Mei '89 was Bogdanowitsj aan de oevers van het Tsjatyr-koel, vanwaar hij kleinere tochten deed naar de bronnen der Aksai, om vervolgens over den Toeroegart-pas naar Kasjgar te reizen 1), d.i. langs denzelfden weg die indertijd door Stoliczka gevolgd is. De geologische ontdekkingen, hier door Bogdanowitsj gedaan, zijn van gewicht, vooreerst daar zijne bepaling van den opperdevonischen kalksteen verschilt met die van Stoliczka, welke hem voor trias hield. Verder komen tusschen de ketens Kara-teke en Kok-tau tertiaire (?) zandgesteenten voor, die in het boven Tojoen-dal doordrongen zijn met geweldige dolerietmassa's. Deze doen zich gedeeltelijk voor als lakolieten en aderen, niet als het zuivere product van vulkanische werking; op de orographische gesteldheid van dit gebied zouden die vulkanische gesteenten ook geen rechtstreekschen invloed gehad hebben. Van Kasjgar wilde B. door het dal der Ges naar het Moestag-ata gebergte gaan, maar door stortregens en het smelten der sneeuw kon hij het dal niet volgen. Hij trok dus naar Jangi hissar en van daar, door de dalen der Kinkol 2) en der Ridshek, naar den Kara-tasj pas, den Moestag-ata en het kleine Kara-koel meer. De 8000 m. hooge Moestag-ata is aan de Z. W. zijde bedekt met gletschers, die zich daar tot 3900-4200 m. uitstrekken; de hoogte der sneeuwlinie bedraagt aan die zijde 5250-5400 m., aan de N. O. zijde 4200-4500 m. Daar zijn geen gletschers, maar oude moraines, die men er aantreft, bewijzen dat ze er eenmaal geweest moeten zijn, tot 3000 m. hoogte Daarentegen is er geen spoor te ontdekken van eene, daarmede overeen komende, grootere uitbreiding der gletschers in vroegeren tijd, aan de 2 W. zijde. De Moestag-ata en de erbij liggende lagere bergen bestaan u gneis, waarvan de richting (Streichungsrichtung) uitsluitend NW.-ZO. is nergens N.-Z. zooals men vermoed heeft. Van Jangi-hissar naar King

¹⁾ Zie PM. '89, p. 294; '90, p. 86. De in den tekst voorkomende namen kan met enkele uitzonderingen, vinden op de door mij bewerkte kaart van het bovenstroog gebied der Amoe-darja, in den vorigen jaargang »Meer Uitgebr. Art." kaart n°. 3.

²⁾ Zie TAG. 1889, A. p. 260, noot. Het is mij later gebleken dat de naam Wikol, tegen mijn bedoeling, op de kaart is blijven staan; zoo heb ik nog enkele ande drukfouten op de kaart opgemerkt, o. a. Fairdy geb. en Fairdy-soe, in plaats water Tairdy; Fagharma in plaats van Tagharma. Ook zijn de gebergten in het Oosten velichter gekleurd dan ik gewenscht had, terwijl de kleur van het geel donkerder is gevallen dan mij lief was en dan op de eerste proeven der kaart het geval was.

kol en Ridshek komt in de nevenketens ook wel de richting NO.—ZW. en zelfs O.—W. voor.

Van het kleine Kara-koel meer ging Bogdanowitsj over den Oeloeg-rabat (-rowat) pas naar het Tagarma-dal en vervolgens — daar het dal der Jarkand-darja, door regens en overstroomingen, ontoegankelijk was — door eene bergachtige streek en langs zijdalen der genoemde rivier, naar den Kysyg-davan pas (Kyzyl-dawan, op mijne kaart), en kwam eindelijk den 19den Juni te Jarkand. Ook op dit gedeelte van zijn tocht deed hij belangrijke geologische waarnemingen; de richting NW.—ZO. heeft ook hier de overhand. Bogdanowitsj kwam tot de overtuiging dat het geheele, uit gneis bestaande massief van den Moestag-ata, met zijne richting van NW. naar ZO., ouder is dan alle ketens van den Pamir, welker richting O.—W. en NO.—ZW. is, en dat deze laatste richting slechts een bijkomstigen (secondairen) invloed op het Moestag-ata gebergte gehad schijnt te hebben, daar zij de oorzaak is geweest van enkele verschuivingen in zijn bouw.

In de omstreken van Jarkand vindt men, op een afstand van 70 tot 100 km., niets anders dan machtige löss-lagen, waarvan de vorming, naar B.'s overtuiging, niet anders verklaard kan worden dan door de aeolische theorie van Richthofen.

Bogdanowitsj bleef eene maand in Jarkand, om de expeditie van kolonel Pjestsof af te wachten. Den 20sten Juli 1889 trok de geheele expeditie daarop naar de bergstreken ten Z. van Jarkand, voorbij Kargalik en Kokjar; te Aktsji-kabak, ongeveer 50 km. ten ZW. van laatstgenoemde plaats, verbleef men geruimen tijd tot het doen van nauwkeurige geographische opnemingen, astronomische, magnetische en verdere wetenschappelijke waarnemingen en het aanleggen van botanische en zoölogische verzamelingen. Bogdanowitsj deed van hieruit opnieuw een tocht, thans in de zichting van Ladak; hij trok over de Tisnab en onderzocht verscheidene tinker zijdalen dier rivier, welke hij beschrijft als buitengewoon rijk, met dennenwouden en alpenweiden bedekt en zeer goed bevolkt. Door een dier dalen "Pachpa", trok hij over den 4800-5000 m. hoogen Tachtakoroempas en naar het dal der boven Jarkand-darja, dat niet bewoond is. Het gebied, dat hij bezocht, ligt tusschen de door de gebroeders Schlaintweit ten O., en Grombtsjefski ten W. ervan, onderzochte streken. Op e gebergten ligt in den zomer weinig sneeuw; op de geheele reis heeft slechts één gletscher gezien, die niet beneden 4500 m. kwam; sporen an vroegere gletschers werden niet onder 4200 m. waargenomen.

De bergstreek ten W van Kok-jar is overal, tot zelfs in de hoogdalen

van het gebergte, bedekt met machtige löss-lagen, die soms eene dikte van 15 m. hebben. Slechts op de hoogste gedeelten van het Tachtakorum gebergte ontbreken zij. Ook op dezen tocht werden weder belangrijke geologische waarnemingen gedaan.

Den 12den September brak de geheele expeditie naar Chotan op, waar men eenigen tijd verbleef; den 22sten October was men te Keria. Van hier zou men naar Nija gaan, om van daar uit eenige kortere tochten te ondernemen en de meer zuidelijk gelegen gebergten tusschen Nija en Tsjertsjen te onderzoeken en te trachten een bergpas te vinden, waarover men in het voorjaar naar Tibet zou kunnen trekken. Den winter zou de expeditie in Nija of Tsjertsjen doorbrengen. Volgens latere berichten zou luitenant Roborofsky, die vroeger Przjewalski op zijne reizen vergezeld heeft, een geschikten pas, om naar Tibet te komen, gevonden hebben. In April 1890 zou men daar over trekken en in September het Lob-noor bereiken 1).

De zooeven genoemde kapitein Grombtsjefski heeft, na zijn ten deele mislukten tocht in 1888 (p. 394 van mijn vorig overzicht) - waarbij hij door Afghanen in het W. en Chineezen (Kirgiezen) in het O. in zijne poging om den Karakoroem te bereiken werd tegengegaan - in Juli 1889 van uit Margelan opnieuw eene reis ondernomen. Daar hij, tengevolge van een aanval der Afghanen op Sjoegnan, niet door Darwas en Sjoegnan naar den Hindoe-koesj kon komen, trok hij langs de Wandsj opwaarts naar den Tagh-doembasj Pamir en over den Ili-soe pas naar de Raskemdarja, welke rivier hij verder opwaarts wilde volgen in het Karakoroemgebergte, om zich vervolgens, na dat gebergte te zijn overgetrokken, naar Chotan te wenden. Ook die poging is mislukt, ten gevolge van den tegenstand der Afghanen, waarna hij over den Aghil-Dawan pas naar de Jarkand-darja en vervolgens over den Tachtakoroem-pas naar het dal der Timaf trok, dezelfde rivier waar Bogdanowitsj drie maanden te voren was geweest (zie boven) en die haar Timab noemt. Daardoor is de verbinding van Grombtsjefski's opnemingen met die der expeditie van Pjeftsof verkregen. In den Hindoe-koesj heeft hij twee nieuwe passen ontdekt, den Koedarpoer, die naar Tsjitral, en den Kelendsj-pas, die naar Koenzjoet (Hoenza) leidt. Zijne in 1888 gedane opnemingen worden in de militaire topographische afdeeling van den generalen staf bewerkt, zoodat men de uitgave eener groote kaart van het zuidoostelijk gedeelte van den Pamir te ge-

¹⁾ PM. 1890, p. 58. Men vindt een uittreksel (in het Duitsch) uit de mededeelingen van Roborofsky in Aus allen Weltheilen." 1890, No. 1 en 2.

moet kan zien; juist een gedeelte dat nog zoo weinig bekend is, met name het gebied van den Tagh-doembasj Pamir 1).

Inmiddels is Koenzjoet in 1889, van het Z. uit, bezocht geworden door kapitein Durand, vertegenwoordiger der Engelsche regeering in Gilgit 2).

Ook de bekende kapitein Younghusband³) heeft, van uit het boven Indus-dal, een tocht gedaan over den Karakoroem naar de Tagh-doembasj Pamir en over den Sjimsjol-pas naar Koenzjoet⁴).

In hetzelfde gebied is ook gereisd door een Fransch koopman, Dauvergne genaamd, die in Kasjmir woont. Van Leh ging hij over den Kolian-pas naar Oost-Toerkestan en over den Pamir naar den bovenloop van de Oxus. Van Sarhad trok hij over den Baroghil-pas naar Jasin ⁵) en door het Karambar-dal naar Gilgit.

Eindelijk zij nog de aandacht gevestigd op een tocht van kolonel M. S. Bell langs den zuidelijken grooten centraal-Aziatischen handelsweg. Hij trok door de provinciën Sjansi, Sjensi en Kansoe en door de Gobi van Ngan-si naar Hami, vervolgens om den oostelijken uitlooper van het Tjan-Sjan gebergte, den Bogdo-ola, naar Barkoel, Goetsjen en Oeroemtsi, de hoofdstad der nieuwe provincie Siu-kiang, welke de vroegere gebieden Kasjgar, Dsoengarijë en Ili omvat. Van Oeroemtsi volgde hij denzelfden weg als Younghusband (zie p. 386 van den vorigen jaargang) over Ka-

l) PM. 1889, p. 228; 90, p. 58 en 134. — CR. 1890, p. 6; mededeeling van Venukoff; Petersb. Zeit. 1890, 23 Febr./7 Maart.

M. Venukoff, Further news of Grombchevskis Expedition across the Pamir. Proc. 1889, p. 171—174. Eene aankondiging van het in 1887 verschenen werk van Grombtsjefaki over zijne reis naar Kasjgar in 1885. 8°, 250 pp. met kaart (Russ.) geeft Venukoff in de Rev. de géogr. 1888, XXIII, p. 315.

²⁾ PM. '89, p. 229.

³⁾ Zie mijn vorig overzicht p. 386.

⁴⁾ PM. '89, p. 277; '90, p. 57.

⁵⁾ Al de in den tekst genoemde namen zijn op mijne bovenbedoelde kaart te vinden. Sarhad ligt aan de Wachan-darja, gelijk de Oxus in den bovenloop heet. De Ishkamanpas, over welken Dauvergne getrokken is na den Baroghilpas, staat niet op de kaart. D. moet het dal der Jarchoen-rivier eerst gepasseerd zijn, gelijk ook blijkt uit zijne mededeeling over het Gas-koel-meer, waaruit de Jarchoen (Yarkhun) ontspringt. Iets oostelijker ligt het Karambar-meer, het bronmeer der Karambar, welke naar de Gilgit stroomt. Dit laatste was tot dusverre niet bekend, en is dan ook niet in overeenstemming met de kaart. Hoe Dauvergne eerst naar Jasin en vervolgens door het Karambar-dal naar Gilgit is gekomen, is niet duidelijk; hij zou dan van uit Jasin, noordoostelijk naar het Gaskoel moeten zijn getrokken en vervolgens zuidelijk. Vgl. PM. '90, p. 57 en 134; Nature 1889, XLI, p. 165; Proc. '90, p. 96.

rasjar, Korla en Koetsjar naar Aksoe en daarna trok Bell over Maralbasji naar Kasjgar.

Zoowel wegens zijne mededeelingen over de beteekenis voor den handel van dien weg, als om de verdere waarnemingen welke hij op zijn tocht gedaan heeft, is Bell's bericht daarover van gewicht 1).

In Achter-Indie heeft de Italiaansche natuuronderzoeker L. Fe a het gebied der onafhankelijke Karinstammen bezocht, ten einde zoölogische verzamelingen aan te leggen, maar hij heeft tevens de geographische gesteldheid en de bevolking dier streken bestudeerd ²).

In het Engelsche gebied van Achter-Indië, nl. in Birma, is men druk bezig met de topographische opneming, welke door officieren van het Engelsch-Indische leger verricht wordt 3). Majoor J. R. Hobday deed opnemingen in de noordelijke Sjan staten, waarbij hij meestal deel nam aan verschillende militaire expedities, naar Thonze, Mailon en Thibaw, welke ten doel hadden het land tot rust te brengen; de landmeter Faida Ali strekte de opneming van Thibaw uit tot aan de Saloeën. Kapitein Jackson verrichtte opnemingen in de zuidelijke Sjan staten en deed, bil gelegenheid der uitzending eener militaire expeditie, een tocht naar de Saloeën, vanwaar hij, door de noordelijke Sjan staten, over Thibaw, naar Mandelai terugkeerde, zonder er evenwel in geslaagd te zijn eene aansluiting te verkrijgen met de trigonometrische opnemingen van Hobday. Kolonel Woodthorpe verrichte eene opneming van de Chindwin (eene zijrivier der Irawady) en van hare zijrivier de Kubo, waarbij hij vergezeld was door J. Ogle, die ook in Januari 1888 de opnemingen deed bij gelegenheid der expeditie van J. F. Needham en kapitein S. J. Michell welke ten doel had eene verbinding te verkrijgen tusschen Assam en de Hukong, welke den bovenloop der Irawady vormt. Hoewel dat niet ge-

i) PM. '90, p. 134. Proc. '90, p. 57-94.

²⁾ L. Fea, Lettere del Carin independenti. Boll. Soc. Geogr. Ital. Roma 1889, p. 854-859. Vlg. PM. '89, p. 100 en TAG. '89, M. p. 389.

³⁾ Zie Proc. '89, p. 567. General Report on the Operations of the Survey of India during 1887-88. Calcutta 1889. In PM. 1889, p. 181 en '90, p. 134 worden daarant enkele mededeelingen ontleend, alsmede aan het rapport over 1886-'87, waarin de volgende afzonderlijke berichten voorkomen: J. R. Hobday, Narrative report on the Survey Operations in the Northern Shan States. 1886-87. — H. M. Jackson, Narrative report on the Survey Operations in the Southern Shan States 1886-87. — R. G. Woodthorpe, Narrative report on the Survey Operations in the Kubo Valley.

In de "Proceedings" 1889, p. 197—216 vindt men ook het verslag van R. G. Wood thorpe, Explorations on the Chindwin River, Upper Birma. Met kaart 1:1,000,000

lukt is, bleek het toch dat er wegen over het gebergte bestaan, welke gemakkelijk bruikbaar gemaakt kunnen worden 1).

In mijn vorig overzicht (p. 389) heb ik terloops melding gemaakt van Walker's veronderstelling dat de Loe (Lu) de bovenloop der Irawady en niet van de Saloeën zou zijn. Deze zaak is nog niet uitgemaakt en de gegrondheid van Walker's gissing wordt zelfs zeer betwijfeld, o. a. door Lullies, die het eens is met den voorzitter van het Engelsch Aardrijkskundig Genootschap, volgens welke zij "only specalutive geography" zou zijn 2). Nog erger dan Walker maakt het Dutreuil de Rhins, die in zijn Mémoire géographique sur le Thibet oriental maar niet wil toegeven dat de Sanpo de bovenloop van de Brahmapoetra is en die ook in zijn antwoord aan Walker 3) bij dat beweren blijft, op grond o. a. dat Needham "aurait affirmé un fait qu'il n'a pas constaté de visu", hoewel Needham toch zegt "I.... was in sight of Rima." In deze kwestie, die trouwens, strikt genomen, geen betrekking heeft op Achter-Indië, heeft Walker zeker het recht wel op zijne zijde, en wat de vraag aangaat of de Lu de bovenloop der Irawady is, deze zal wellicht beslist worden door de reis van luitenant Vans Agnew, die in Maart 1889 uit Indie moet zijn vertrokken om de Saloeën te volgen, van af het punt waar de karavaanweg van Bhamo (aan de Irawady) naar Junan die rivier snijdt, tot het verste punt dat de Fransche zendelingen Desgodins en Dubernard in 1871 bereikt hebben. Indien hij dan, langs de rechter (de westelijke) zijde der

¹⁾ Vgl. ook TAG. 1888, p. 412 en 413. De heer Niermeyer zegt daar, dat Jackson de opnemingen met de noordelijke Sjan staten tot stand heeft gebracht, terwijl in PM. 1890, p. 134 wordt beweerd dat J. daarin verhinderd werd door den heerschenden nevel. In het uittreksel uit het rapport der werkzaamheden in Indië (Proc. '89, p. 567) staat omtrent die aansluiting niets vermeld; vermoedelijk zal Wichmann het bericht ontleend hebben aan het in de vorige noot opgegeven verslag van Jackson over zijn epnemingen in 1886—'87, dat ik niet tot mijn beschikking heb, hoewel de mededeeling van Wichmann klaarblijkelijk betrekking heeft op het jaar 1887—'88. Wellicht heeft Niermeyer zijne mededeeling ontleend aan PM. '88, p. 222, waar inderdaad, op grond van een bericht in Nature, 7 Juni 1888, van die aansluiting gewag wordt gemaakt. De officiëele Engelsche rapporten waren toen nog niet gepubliceerd.

²⁾ Behm 1888, XII, p. 173.

³⁾ Lettre du général Walker à propos de la notice de M. de Rhins sur le Thibet. Bull. '88, p. 519-29; Dutreuil de Rhins, Réponse à la lettre de M. le général Walker. Ib., p. 580-43. (Ref. van Lullies. PML. '90, n°. 12ª en 12b). Vlg. ook Behm t. a. p. p. 173 en J. Needham, Journey along the Lohit Brahmaputra between Sadiya in Upper-Assam and Rima in South Eastern Thibet. Suppl. Paper R. G. Soc. 1888, p. 487-555. Met kaart 1: 380,000.

rivier gaande, geen naar het W. stroomende rivier moet passeeren, is Walkers gissing ongegrond.

Over de vaststelling der grens tusschen Britsch-Birma en Siam is nog niets bepaalds mede te deelen, hoewel de opnemingen der grenscommissie in het gebied der kleine Sjan-stammen, welke onder leiding van Ney Elias hebben plaats gehad, thans voltooid zijn.

Van de zijde der Franschen is eveneens eene commissie benoemd, onder leiding van A. Pavie, om de grenzen van Siam met Tongking en Anam vast te stellen 1). In April 1890 is hij daartoe van Hanoi naar Loeang Prabang aan de Mekong vertrokken, terwijl hij die reis in omgekeerde richting ook reeds vroeger gedaan had, met het doel om eene rechtstreeksche verbinding tusschen de Mekong en de Songka te verkrijgen 2). Kapitein Cupet heeft (Jan.—April '89) van Loeang Prabang een anderen weg dan Pavie gevolgd om de kust te bereiken, en wel bijna geheel door nog onbekend gebied; hij kwam aan de kust bij Vink (Win) in Anam.

Een andere belangrijke reis is die van G. Gauthier, in Dec. 1887 en Jan. 1888, langs de Mekong, van af Loeang-Prabang tot aan den mond der rivier 3), waaruit gebleken is dat die rivier grootendeels eene bruikbare scheepvaartverbinding met het gebied der Loas-stammen vormt. Tusschen Khong en Ta-Sainam zijn geweldige stroomversnellingen, die een onoverkomelijke hinderpaal voor de scheepvaart vormen. Het door Gauthier bevaren gedeelte, ter lengte van omstreeks 2000 km., verdeelt hij in drie gedeelten. De bovenloop van Loeang-Prabang tot Sampana is, wegens de vele stroomversnellingen, onbruikbaar voor stoomschepen; het gedeelte tot Kemmerat, dat behoort tot de vruchtbaarste en meest bevolkte streken van het Laos-gebied, kan het geheele jaar door, met stoomschepen bevaren worden; van Kemmerat tot Khong is dat alleen bij hoogen waterstand het geval. De luitenants Réveillère-en De Fésigny zijn hier met stoomschepen opwaarts gevaren tot Stung-Streng.

Ook de Songka schijnt voor de scheepvaart bruikbaar te zijn; den 21sten Juli 1889, zou een stoomschip die rivier zijn opgevaren tot Laokat

¹⁾ PM. 1890, p. 184.

²⁾ PM. '89, p. 101 en 181. Rev. Française 1889, p. 216—223, waar M. Voulzie een overzicht geeft van de pogingen der Franschen om de in den tekst bedoelde verbinding te verkrijgen.

³⁾ PM. '89, p. 101. G. Gauthier, Une exploration commerciale au Laos. Bull. de la Soc. Géogr. commerc. de Paris, IX, 1888—89, p. 10—72, met kaart, sch. 1:5,000,000.

n de grens van Junan ¹). Nadere bijzonderheden daaromtrent heb ik hter niet gevonden.

Overgaande tot de vermelding van verschillende publicaties over Achterlië, vestig ik in de eerste plaats de aandacht op de kaarten der Indian
rveys, van het Hydrographical Department en van de Service Hydrotphique, alsmede op de kaart van Nay (1:1,000,000. Paris, Challamel
90. fr. 2), waarop o. a. de noordelijke grensdistricten van Tonkin,
ar den kant van China, welke tot dusver zoo goed als geheel onbend waren, zijn voorgesteld 2).

Het aantal geschriften is overigens zeer groot, hoewel lang niet alle n veel belang zijn uit een geographisch oogpunt.

Onder de werken over Tonkin en Anam noem ik die van De Lassan, Lehautcourt, Dumoulin, Petit, Sarran, Silstre, Antonini, en Brousmiche³).

Uit het oogpunt van koloniale geographie heeft het werk van De Lasan, die op dat gebied, nl. door zijne werken over de Fransche kolon, reeds een welgevestigden naam heeft, hooge waarde. Behalve eene gebreide beschrijving van het land, de bevolking, het klimaat, de tuurgewassen, de veeteelt, de industrie en den handel van Fransch do-China, geeft de schrijver ook overzichten over de staatkundige en de

⁾ PM. 1889, p. 229.

l) PM. '90, p. 134.

J. L. de Lanessan, L'Indo-Chine Française. Etude politique, économique et binistrative sur la Cochinchine, le Cambodge, l'Annam et le Tonkin. 8°, 765 pp. q cartes en couleurs hors texte. Paris, Félix Alcan, 1889, fr. 15. (Ref. van Metz-, PML. '89, n°. 774, besproken in Proc. '89, p. 512).

P. Lehautcourt, Les expéditions françaises au Tonkin. Dl. I. Gr. 8°, 544 pp. Met tren &c. Paris, Journal »Le spectateur militaire", 1888. (Ref. v. Weyhe, PML. '89, 775a).

Dumoulin, *Le Tonkin. Exploration du Mékong.* 393 pp. Paris, Ch. Delagrave, 8. (Ref. v. Weyhe, PML. '89, n°. 775^b).

R. Petit, Le Tong-Kin. 8°, 239 pp. Paris, Lecène & Oudin, 1888.

B. Sarran, Etude sur le bassin houiller du Tonkin. Paris, Challamel, 1888. (Ref. Supan, PML. '89, n°. 782b).

Silvestre, L'empire d'Annam et le peuple annamite. 8°, 380 pp. Met kaart. Pa-Félix Alcan 1889. (Ref. van Weyhe, n°. 2925).

P. Antonini, L'Annam, le Tonkin et l'intervention de la France en Extrême-Orient 316 pp. Paris, Blond et Barral 1889.

B. Brousmiche, Aperçu général de l'histoire naturelle du Tonkin. Cochinchine franç. cursions et Reconnaissances. Saigon 1887. Dl. XIII, p. 161—201. (Ref. van Supan, 782a).

staathuishoudkundige toestanden en deelt hij zijne denkbeelden mede over de beste wijze van bestuur in zulke door verovering verkregen bezittingen. De werken van Lehautcourt en Dumoulin hebben betrekking op de verovering van Tonkin door de Franschen, en het eerste ook op de geschiedenis van hetgeen sedert het laatst der vorige eeuw door hen aldaar en in Anam verricht is, met het doel om handelsverbindingen aan te knoopen. Sarran geeft eene beschrijving van de kolengebieden in Tonkin, welke in het werk van Silvestre in uittreksel wordt overgenomen; de rijkdom aan steenkool moet zeer groot zijn; ook ijzer komt voor. De planten- en de dierenwereld van Tonkin worden door Brousmiche beschreven.

Over Siam en het schiereiland Malaka zijne mede enkele werken te vermelden, nl. die van Chevillard en Errington de la Croix, alsmede de regeeringsverslagen omtrent den toestand en de handelsbeweging der Engelsche bezittingen in Malaka 1).

Over de verovering van Birma door de Engelschen heeft Browne een werk uitgegeven²), waarin ook over land en volk vele belangrijke mededeelingen worden gedaan.

Ook bij Voor-Indië valt het eerst de aandacht op de topographische opnemingen der Engelsche officieren en op de onderzoekingen in Sikkim, Boetan en Tibet³).

In 1887—'88 werden die opnemingen verricht onder leiding van kolonel H. R. Thuillier; behalve eene secundaire triangulatie langs de kust van Madras, had men twee reeksen van triangulaties uitgaande van die aan den Indus, tot in Beloedsjistan, die samenliepen in Quetta. De topographische en de kadastrale opnemingen hadden in verschillende gedeelten van noordelijk Voor-Indië plaats; de lengte-bepalingen, door middel van den telegraaf, werden hervat en tusschen de stations der driehoekspunten in zuidelijk Indië werden zeven lengte-boogmetingen gedaan.

¹⁾ S. Chevillard, Siam et les Siamois. 8°, 289 pp. Paris, Librairie Plon., 1886 (Ref. van Weyhe, n°. 2935).

J. Errington de la Croix. La géographie politique et la situation économique de la Péninsule Malaise en 1887. Bull. Soc. Géogr. hist. Paris 1888, p. 284—325. Kant 1:5,100,000. (Ref. van Supan, n°. 2955).

Straits Settlements. Further Correspondence respecting the Protected Malay States Parliamentary Paper. C. 5566. London 1888. 1 sh. 6 d. (Ref. v. Supan, no. 798).

²⁾ E. Ch. Browne, The coming of the great Queen, a narrative of the acquisition of Burma. 8°, 451 pp. Met 3 kaarten en 13 afbeeldingen. London, Harrison & Ca 1888. (Ref. van Weyhe, n°. 798).

³⁾ Zie Proc. '89, p. 567-569.

Bij gelegenheid eener expeditie (Oct. Nov. 1888) tegen de oproerige stammen in het Zwarte Gebergte (Black Mountain), aan den linkeroever van den Boven-Indus, hebben er topographische opnemingen in dat gebied plaats gehad, waaromtrent kapitein R. A. Wahab 1) het volgende mededeelt. Het geheele gebied is opgenomen tot aan de grens van het Akazaiand en ook aan gene zijde van den Indus. Ten N.O. van het Zwarte Gebergte zijn opmetingen gedaan van af Naudehar, het verste punt waar in 1868 nog opnemingen hebben plaats gehad, noordwaarts tot aan de bergketen beneden Allahi en westwaarts tot aan de heuvels langs den Indus. De loop dier rivier werd, tot 15 E. mijlen ten N. van Thakoh bepaald, en eene kaart werd gemaakt van het gebied tusschen Indus en Surat en van alles wat Wahab van het Chal-gebergte en den Ghorapherpas te zien kon krijgen. Het Allahi-dal werd bijna geheel door Imam Sjerif opgenomen. — Door een ander "assistant surveyor", Yusuf Sjerif, werden belangrijke opnemingen gedaan in het noordelijk grensgebied van Afghanistan, bij gelegenheid van de werkzaamheden der "Afghan Boundary Rectification Commission", onder kolonel Yate, in October 1887.

In het verslag betreffende de onderzoekingen in Sikkim, Boetan en Tibet³) vindt men mededeelingen aangaande reizen welke in de laatste negen of tien jaren, door inboorlingen van Indië, zijn gedaan. De reis van K—P, of Kinthup is reeds, in ons tijdschrift, door den heer Niermeyer, vermeld³).

¹⁾ PM. '89, p. 100 en '90, p. 133. Athenaeum, 18 Januari 1889; Bluebook C. 5561; roc. 1890, p. 169, waar wordt medegedeeld dat de in 1884 door Wahab gedane opesting van het Zhob-dal thans wordt voortgeset door luitenant-kolonel Holdich.

²⁾ Report on explorations in Sikkim, Bhutan and Thibet. Dehra Dun 1889. Proc. 99, p. 568.

³⁾ TAG. '88, p. 411. — Needham is, blijkens eene beknopte mededeeling in de roc. '89, p. 440, van oordeel dat K.—P.'s berichten niet in allen deele juist zijn. Voortest is er geen plaats bij de Abors die Miri Padam heet (vlg. het schetskaartje X bij bijn overzicht van het vorige jaar). De eigenlijke Abors noemen zich Padams, maar un gebied ligt verscheidene dagreizen oostwaarts van de Dibong.

Verder werd aan K.- P. gevraagd of hij te Simong geweest was, de hoofdplaats van sam, welke ten N. W. van het gebied der eigenlijke Abors (d. i. der Padams) t, waarop hij bevestigend antwoordde.

Toen hem versocht werd die plaats te beschrijven zeide hij dat zij op een zeer hoon heuvel, dicht bij de Dibong, is gelegen, terwijl zij in werkelijkheid niet op een
avel en ver van de rivier af ligt. Men zou dus geneigd zijn Niermeyer's uitdruking die lama was een bedrieger", ook toepasselijk te verklaren op K.—P. Needham
verder van meening dat de bronnen der Dibong niet, zooals door vele geografen

De lama U. G. deed eene reis van Darjeeling over den Donkhya (la = pas), Khamba Jong en Gyantse Jong naar Shigatse en Tashi Lhunpo, aan de Sanpo-rivier, en vervolgens naar het Yamdoktso of Palti meer; van daar zuidelijk langs de Lhobrak, welke de Monas rivier van Assam is, en daarna noordoostwaarts naar Chethang en Lhasa. Ook deze reis, evenals die der pundits R-N en P-A, is reeds door Niermeyer vermeld 1) De Lhobrak of Kwin-Tschu, is volgens de R-N, de belangrijkste rivier van Bhutan. Opmerkelijk is het dat de Tibetanen den lama U. G., toen zij hem op de grenzen van Bhutan aanhielden, zoo goed behandelden. Zij wisten zeer goed met welk doel hij op reis was, maar zij lieten hem toch in het bezit van zijn instrumenten enz. en gaven hem zelfs een pas, op voorwaarde dat hij niet naar Lhasa zou gaan. Nogtans is hij daar gekomen en slaagde hij erin die stad vluchtig op te nemen en velerlei inlichtingen te verkrijgen aangaande het bestuur en de maatschappelijke en godsdienstige instellingen der Tibetanen. Gelijk wij reeds weten heeft hij ook de ware gedaante van het Yamdok-meer bepaald.

De Engelschen trachten tegenwoordig, onder leiding van den bekenden kolonel H. C. B. Tanner, in de staten Nepal en Bhutan triangulaties op groote afstanden te doen, door van af de grenzen, de richtingen waarin men de op een grooten afstand zichtbare toppen waarneemt, te bepalen van uit verschillende punten. In het aldus verkregen driehoeksnet worden dan de routes der Indische opnemers ingevuld.

De uitgave der kaarten van de Indian Surveys wordt geregeld voortgezet; beschouwt men de overzichtskaartjes 26 en 27 van den stand der trigonometrische opnemingen in Wagner's Geographisches Jahrbuch 1888, dan blijkt dat nagenoeg geheel Voor-Indië en Assam gereed zijn. De kaarten van den Indian Atlas worden, voor het meerendeel, in den handel verkrijgbaar gesteld en hebben, voor een deel in verkleinden maatstaf,

wordt verondersteld, zeer ver ten N. van Sadiya liggen, maar vrij dicht er bij, en dat wel op grond van door hem ingewonnen inlichtingen bij dozijnen van Mishmi's, die bij kent en die hem herhaaldelijk verzekerd hebben dat zij, telkens wanneer zij van hunne woonplaats aan de Dibong (voorbij de kloof van Nizamghat), naar de Tibetaansche stad Alüpó gaan, dicht voorbij de bronnen dier rivier komen. Genoemde stad nu ligt aan de noordelijke helling van een hooge bergketen (de Himalaya), die de grensscheiding vormt tusschen het gebied der Mishmi's en Tibet.

¹⁾ T.a.p., p. 411. Niermeyer spreekt van den pundit Lama, en bedoelt daarmede den lama U. G. (Vlg. PM. '86, p. 185, waar die benaming evensoo, nl. als pundit Lama, voorkomt). Zie ook: H. C. B. Tanner, Notes on explorations in Bhutan and on the Lower Sangpo river. Rep. Surv. of India 1886—87, p. LXXXVI, 2 kaarten.

ook betrekking op bepaalde onderwerpen, bijv. kanalen, spoorwegen, de met indigo of andere gewassen beplante gronden enz. 1). Een kleinere atles van Indië is die van Saunders²); de kaarten zijn in den regel op de schaal van 1: ca. 7 mill. Kaart no. 1 is eene oro-hydrographische kaart; op n°. 2 zijn de stroomgebieden en de besproeiingskanalen in het Indusen het Gangesgebied voorgesteld; n°. 3 is een staatkundige kaart, enz. Het aantal werken over de geologische gesteldheid van verschillende gedeelten van Voor-Indië is vrij groot; vooreerst zij gewezen op het reeds in 1888 verschenen werk van Oldham, bevattende een bibliographisch overzicht der geologische werken over Voor-Indië tot 1887 3); dezelfde schrijver heeft ook geologische onderzoekingen ingesteld in het Simla-gebied. Foote deed zulks in Zuidelijk Indie, Jones in het steenkoolgebied van het Sátpura Gondwána bekken, Lydekker in Kasimir en Chamba, Walther bestudeerde de laterietvorming in Voor-Indië en de koraalriffen in de Palkstraat en de golf van Manaar, Latouche de kolengebieden van Cherra Poonje, in de Khasia Hills en in Kashmir, Griesbach de vormingen in Spiti 4).

¹⁾ De opgaven dier kaarten en bladen worden gepubliceerd in Proc. en PML.

²⁾ T. Saunders. An atlas of twelve maps of India. Gr. fol. met 37 pp. tekst. London, Stanford, 1889. Pr. 3 L. 3 sh. = c. f 38. (Ref. van Supan, PML, 1889, no. 2959.)

³⁾ R. D. Oldham, A Bibliography of Indian Geology. Being a list of Books and Papers relating to the Geology of British India and adjoining Countries, published previous to the end of A. D. 1887. 8°, 146 pp. London, Trübner, 1888. Pr. 3 sh.

Idem, The Sequence and Correlation of the Pre-tertiary sedimentary Formations of the Simla Region of the Lower Himalayas. Rec. Geol. Soc. of India 1888, XXI, p. 180—43. (Ref. van Supan, PML. '89, n°. 831).

⁴⁾ R. B. Foote, The Dharwar System, the chief auriferous rock series in South India. Rec. Geol. Soc. of India 1888, XXI, p. 40—56. Kaart 1:2 mill. en 1889, XXII, p. 17—39. (Ref. van Supan, PML. '89, n°. 835 en '90, n°. 41; de aanwijzing skbendas." bij het laatstgenoemde is minder duidelijk, daar men zou denken dat zij betrekking heeft op de -Verh. der Ges. f. Erdk". waarin Walther's mededeeling, referant n°. 37, voorkomt).

E. A. Jones, The southern Coal-fields of the Satpura Gondwana Basin. Rec. Gool. S. of India 1887, XXI, p. 1-58. 2 kaarten. (Ref. van Supan, PML. '89, n°. 836).

R. Lydekker, The Geology of the Káshmir and Chamba Territories and the British District of Kháyán. Rec. Geol. S. of India 1888, XXII, Gr. 8°, 344 pp. (Ref. v. Supan, PML. '89, n°. 2962).

Dr. Joh. Walther, Bericht über die Resultate einer Reise nach Ostindien im Win-1888-89. Verh. Ges. f. Erdk., Berl. 1889, p. 318. (Ref. van Supan, PML. '90, 22°, 37).

T. D. La Touche, Report on the Cherra Poonje Coal-Field, in the Khasia Hills.

Onder de werken van algemeenen aard over Indië noem ik die van Strachey, Burton, Garbe, Holcomb en Macintyre's Strachey behandelt de staatsinstellingen, het leger, de financiën, den handel de openbare werken, de wetgeving, de rechtspleging enz. Ook geeft hij een overzicht van de geographische gesteldheid des lands, de groote rivieren, het klimaat en de bevolking.

De werken der overige schrijvers bevatten beschrijvingen van reizen in verschillende gedeelten van het groote schiereiland; in dat van Burton zijn belangrijk de talrijke beschrijvingen van steden; Macintyre heeft uitgestrekte tochten in het Himalayagebied gedaan en, hoewel het doel daarvan hoofdzakelijk de jacht was, heeft hij toch ook gelegenheid gevonden tot het doen van waarnemingen betreffende het land en de bevolking.

Vermelding verdienen verder de werken van Ferguson en van A. Ferguson en Mand over Ceylon²). De nieuwste opgaven voor de belangrijkste cultures op Ceylon zijn, in hectaren: cardamom 6000 (met eene waarschijnlijke toeneming tot 12,000), vruchtboomen 60,000, koffie 50

Rec. Geol. S. of India '88, XXII, p. 167. — Report on the Sangar Mary and Melow-gala Coal-Fields, Kashmir. Ib. '88, XXI, p. 62—70.

C. L. Griesbach, The Sequence of formations in Spiti. Ib. 1889, XXII, p. 158.

¹⁾ Sir John Strachey, *India*. London, Kegan Paul, Trench & C^o, 1888. 8°, XIV en 399 pp. Met kaart. Pr. 15 sh. (Aangekondigd in Proc. 1889, p. 56 en 57; Academy 1888, n°. 866, p. 363).

Lieut.-Gener. E. F. Burton, An Indian Olio. With illustrations from sketches by the author and by Miss C. G. M. Burton. London, Spencer Blackett (1888); crown 8°, XII en 388 pp. Pr. 7 sh. 6 d. (Aangekondigd in Proc. 1889, p. 54 en Athesseum 17 Nov. 1888, p. 657).

R. Garbe, Indische Reiseskizzen. Gr. 8°, 254 pp. Berlin, Gebr. Paetel, 1889. Pr. 6 M. (Ref. van Weyhe, PML. 1889, n°. 2961).

H. H. Holcomb, Bits about India. 16°, 272 pp. Philadelphia 1889. Pr. 5 sh.

D. Macintyre, Hindu-Koh. Wandering and wild sport on and beyond the Himblayas. VIII en 464 pp. met afbeeldingen. Edinburg en London. Blakwood & S. 1889. (Ref. van Weyhe, PML. '90, n°. 26).

²⁾ J. Ferguson, Ceylon in the Jabilee Year. 8°, XIV on 427 pp. met afbeekingen on 2 kaarten. London, Haddon & C°, 1887. (Ref. van Supan, PML. 89, n°. 828).

— Review of the planting and agricultural industries of Ceylon and statistics of the planting enterprises in India and the Colonies. 8°, 168 pp. Colombo 1888.

A. Ferguson, and J. Mand, Ceylon handbook and directory, and compending of useful information (1887—88). To which is prefixed a review of the planting enterprise and agriculture of the colony, with statistical information referring to the planting enterprise in other countries. 8°, 943 pp. Colombo 1888. Pr. 21 sh.

tot 60,000, thee 64,000 (met eene mogelijke toeneming tot 100,000), cacao 6,000, chinaboomen 16—24,000, gomboomen enz. 2,000 (met eene mogelijke toeneming tot 20,000). Op de kaart (sch. 1:760,000, bij het toeste in de noot genoemde werk is de verdeeling der voornaamste cultures en der wouden aangegeven, op de tweede, kleinere kaart vindt men de bestaande, de in aanleg zijnde en de ontworpen spoorwegen. De bevolking van het eiland bedraagt 2,950,000, die der hoofdstad Colombo 120,000, de oppervlakte van het bebouwde land 1,270,000 hect., de veestapel 1,500,000 stuks.

Over de meteorologie van Indie zijn verschillende tijdschriftartikelen van Hann, Köppen e.a., alsmede twee grootere werken verschenen, al. het verslag van Eliot over 1886 en het nieuwere werk van Blanford.) In het laatstgenoemde worden het klimaat en de weersgesteldheid der verschillende gedeelten van Indie uitvoerig beschreven, en worden de verdeeling van den luchtdruk en de windrichtingen, in den loop van het jaar, besproken. De regenwaarnemingen hebben plaats gehad op 451 stations, zoodat ook daarvoor een uitgebreid materiaal ter beschrijving voorhanden is; de schrijver geeft ook eenige belangwekkende beschouwingen over de verdamping der groote wateroppervlakten.

Omtrent de landen die in het N.W. aan Voor-Indie grenzen en het nitgestrekte Iranische hoogland vormen, is weinig nieuws te vermelden. De Karoen-rivier, welke zich, vóór hare uitwatering in de Perzische Golf, rereenigt met de Sjat-el-Arab, is in November 1888, bij besluit van den Sjah, voor de scheepvaart opengesteld. De rivier mag tot Ahwas, op 200 km. 2) van den mond, bevaren worden; bij genoemde plaats zijn stroom-rersnellingen. Kolonel M. S. Bell geeft eene beschrijving van eene door hem in 1884 gedane reis in het gebied der rivier en deelt bijzonderheden mede

¹⁾ J. Eliot, Report on the meteorology of India 1886. 4°, 227 pp., met kaarten. Calcutta 1887.

H. F. Blanford, A practical guide to the climates and weather of India, Ceylon and Burmah and the storms of Indian seas, based chiefly on the publications of the Indian Meteorological Department. 8°, XIII, 369 pp. London, Macmillan & C°. 1889.

Pr. 12 sh. 6 d. (Ref. van Günther PML. 1890, n°. 42).

Zie de opgave der artikelen in Hann's Met. Zeitschr. 1888 en '89. PML. '89 en '90.

2) PM. '89, p. 26. Zie ook het beknopte overzicht van Sir R. Murdoch Smith's voordracht voor whe London Chamber of Commerce", over The Karún River and British Trade with Persia, in Sc. G. Mag. 1889, p. 381 vlg.; alsmede het artikel van R. C. Keun de Hoogerwoerd, Die Häfen und Handelsverhältnisse des Pertischen Golfs und des Golfs von Oman. Ann. d. Hydr. & C. Berlin 1889, XVII, p. 189. (Ref. van Supan, PML. '89, n°. 2739).

over de toestanden aldaar 1). Het gebied aan den bovenloop der Karo is bezocht door A. Rodler, bij gelegenheid eener geologische expediin het Bachtyaren-gebergte. Van Sultanabad ging hij door de landschapen Djapelak en Serabend, naar de Sjoetoeroen Koeh (3500 m.), en or Ispahan in Z. W. richting naar Tsjiqua Chor, waar de Bachtyaren de zomers verblijf houden 2).

Onder de werken over Iran verdienen de aandacht de geologische beschrijvingen van eenige gedeelten van noordelijk Perzië door Bogden owitsj³) en het artikel van den Hollandschen consul-generaal Kende Hoogerwoerd over de havens en de handelstoestanden aand Perzische Golf en de Golf van Oman, waarop reeds boven (noot 2 p. 68) werd gewezen, en dat eene groote hoeveelheid gegevens betreffende de handel en de gesteldheid der verschillende landen langs de genoemd golven en de klimatologie dier streken bevat.

Indien wij de publicaties over Toeran en Siberië nagaan, vinden wihoofdzakelijk tijdschriftartikelen). Grootere werken zijn die van Bot langier, Curzon, Cholet, Grodekof en Arandarenko van welk laatste, dat in het Russisch geschreven is, door Seidlitz en uitgebreid referaat wordt gegeven.

¹⁾ PM. '89 p. 228. Blackwood's Mag. April—Juli '89, met kearten. Besproken in Pre' '89, p. 313. Vlg. ook over zijne uitgestrekte reizen PM. '89, p. 100; Athenaeum 19 Jan.'

²⁾ PM. '89, p. 28. Vlg. ook A. Rodler, Bericht über eine geologische Beise westlichen Persien. Sitz. Ber. Ak. Wiss. Wien 1889. Bd. XCVIII, p. 28-39. Wien Tempsky, 1889. Pr. 0.30 M. (Ref. van Supan, PML. '89, n°. 2818), alsmede vad den zelfden schrijver, Der Urmiasee und das nordnoestliche Persien. 12°, 4 pp. Wien, Ver. z. Verbr. naturw. Kenntn. '87. Einige Bemerkungen zur Geologie Nature. Sitz. Ber. Ak. Wiss. Wien '88. (Ref. van Supan, n°. 679a en 679b in PML '89)

³⁾ Ch. Bogdanowitsj, Description de quelques dépôts sédimentaires de contrée Transcaspienne et d'une partie de la Perse septentrionale. Notes sur la géometre de l'Asie centr. I. 8°, 192 pp. (Ref. van Supan, n°. 2816). — Opmerkingen en de orographie en de geologie van Noordelijk Perzië. Izwèstija 1888, XXIV, p. 201-223. (Ref. v. Ed. Brückner, n°. 2817).

⁴⁾ In PML. '89, no. 686-718; 2821-2862.

⁵⁾ E. Boulangier, Voyage à Merv. Les Russes dans l'Asie centrale et le che min de fer transcaspien. kl. 8°, 451 pp. Paris, Hachette & Cie. '88. Prijs fr. 35 (Ref. van Weyhe PML. '89, n°. 690).

G. Curzon, Russia in Central Asia in '89 and the Anglo-Russian question \$\frac{3}{477} pp., met kaart. London, Longmans, 1889. Pr. 21 sh. (Ref. van Heyfelder, no. 2356) Comte de Cholet, Excursion en Turkestan et sur la frontière russo afghand 18°, 286 pp., met kaart. Paris, Plon, 1889. Pr. 4 fr. (Ref. van Lullies, PML. '90, no. 9)

parlement wilde hij, voor het geval de Oostersche kwestie aan de mocht komen, daarover kunnen meespreken op grond van hetgeen kelf gezien heeft. Ook had hij zich vooraf op de hoogte gesteld alles wat er over Boechara, Toerkestan, Perzië en het Transkashe gebied geschreven is 1). De tocht van Cholet, door zuidelijk Toern naar Merw en Boechara in 1887—88, heeft uit een geographisch unt niet veel nieuws opgeleverd, maar zijn verhaal bevat toch op plaatsen belangrijke mededeelingen over het land en zijne bewoners, over de wijze van koloniseeren der Russen in die streken.

r. O. Hey felder, geeft in Pet. Mitt. eene beschrijving van Boechara ijne bewoners ³) Deze tamelijk groote Mohammedaansche staat van 5000 M. (275,000 qkm) oppervlakte, met 2,130,000 inwoners, vormt met zijne naardige staatkundige en maatschappelijke toestanden, zijne historische itien, zijn handel en zijne industrie, om zoo te zeggen, een eiland te den van den langzaam voortgaanden stroom der Europeesche beschaving, overblijfsel der macht van den Islam, een voorwerp van verbazing voor Europeaan, die zich met de bestudeering ervan bezighoudt. Wij vinden instellingen en toestanden welke tot de meest verschillende tijdperken de ontwikkeling der menschheid, tot allerlei historische tijden beren: naast zaken welke aan de klassieke oudheid en de middeleeuwen inneren, bestaan andere die ons in de tijden der Joodsche geschie-

I. J. Grodekow, Die Kirgisen und Karakirgisen des Syr Daria-Gebietes. Bd. Tasehkent 1889. (Ref. van Heyfelder, n°. 10).

F. A. Arandarénko, Mussestunden in Turkestan. 8°, VI en 666 pp. St. Petersg 1889. (Russ.) (Ref. van V. Seidlitz, PML. '90, n°. 8).

⁾ Vlg. ook: The Transcaspian Railway. By the Hon. G. Curzon, Proc. '89, p. Met kaart 1:5,900,000. Zoowel het beknopte overzicht van den aanleg der lijn de overwonnen bezwaren, als de opmerkingen betreffende de militaire en de commercie voordeelen van dezen spoorweg voor Rusland, zijn de lezing overwaard. Ook de zussie, die steeds volgt op de voordrachten, welke voor het Genootschap gehouden rden, verdient de aandacht. De kaart is duidelijk en de staatkundige grenzen der den tot 78° O. L. v. Gr. worden er op aangegeven.

n) Buchara an der Schwelle der neuen Zeit. Von Staatsrat Dr. O. Heyfelder. L. 1889, p. 168 en 261.

In PM. 1890, p. 99 vlg. komt het slot van het artikel voor, waarin het onderwijs, godsdienst, de staatsregeling en de verschillende ziekten, aan welke de bevolking it, beschreven worden. Vlg. ook het opstel van denzelfden schrijver: Buchara nach und der Transkaspischen Eisenbahn. Unsere Zeit 1888, n°. 10, p. 339, met kaart, en: lder aus Buchara. DRGS. 1888, X, p. 433.

denis verplaatsen, of wel te midden der nieuwere beschaving van het Westen. De schrijver geeft een overzicht van het land, de verschillende volkstammen (Tadsjiks, Oesbeken, Turken, Turkmenen, Arabieren, Perzen, Joden, Indiers of Hindostani en Afghanen), de handwerksnijverheid en den handel. In een tijd als de onze, waarin de aandacht zoozeer op het Oosten, en meer in het bijzonder op Centraal-Azië gevestigd is, zijn opmerkingen en mededeelingen als die van Heyfelder (o.a. op p. 164, over de afstamming en de stamgemeenschap der verschillende volken, die hier bij elkander wonen) van veel belang. De onverdraagzaamheid der rassen tegenover elkander is in Azië bijna onbekend. "Wie hatten sich sonst in Samarkand, der Timurstadt, in dem-orthodoxen Buchara, in Kerminé, Karakul etc. diese Nester und Kolonien unvermischter Araber, Türken, Perser oder Turkmenen erhalten können, die sich noch heute mit leuchtenden Blicken nennen, was sie sind, die Alten wie die Kinder, die Frauen wie die Manner?"

Naast deze bijdrage tot de kennis van een gedeelte van het gebied waar de Russen met den dag meer macht en invloed krijgen, verdient genoemd te worden het opstel van Annenkof, die den Transkaspischen spoorweg heeft aangelegd, over de geschiktheid van Centraal-Azië voor kolonisatie door de Russen!). Ook dit vraagstuk heeft voor de toekomst van Russisch-Azië eene hooge beteekenis. De schrijver wijst er eerst op dat generaal Münnich in 1736, na zijn tocht naar de Krim, de streken welke hij (in het tegenwoordige Zuid-Rusland) was doorgetrokken, beschreef als woestenijen waar geen wegen en geen dorpen waren en waar de verzorging van manschappen en paarden op de grootste bezwaren stuitte.

Thans heeft men daar bloeiende steden als Odessa, Rostof, Taganrog, Cherson en Jekaterinoslaf, terwijl de bevolking 10 millioen zielen bedraagt en het land jaarlijks 3,5 millioen tsjetwert 2) graan oplevert. Met behulp van kunstmatige besproeiing zou, naar de meening van den schrijver, evenzeer een groot deel der vruchtbare lössgronden van Centraal-Azië voor bebouwing en kolonisatie geschikt zijn te maken. De redactie van Pet. Mitt. zegt, in eene noot, dat de beteekenis van Annenkof's beschouwingen niet zoozeer ligt in de détails, die wellicht voor een deel tegenspraak zullen uitlokken, als wel hierin dat zij waarschijnlijk de uitdrukking zijn van de denkbeelden en verwachtingen der hoogste regeeringskringen

¹⁾ Die Eignung Zentralasiens zur Einführung russischen Lebens. Von M. N. Amnenkow, Kais. russ. General-leutnant. PM. 1889, p. 142.

²⁾ Een tsjetwert = 2,099 hectol.

Rusland. Hoe dit ook zij, de Russen hebben genoegzaam getoond dat then met hunne ondernemingen in Centraal-Azië ernst is en al mogen sker verwachtingen misschien wat hoog gespannen zijn, zeker is het toch ok, dat er nog veel vooruitgang te verwachten is. De uitgebreide terkzaamheden van het Russisch Aardrijkskundig Genootschap, ook in de keuw verworven gebieden, zullen daartoe veel bijdragen.

Dat de arbeid der Russen inderdaad van veel gewicht is blijkt o. a. uit bet overzicht betreffende de vorderingen in de cartographie van het Russische Rijk, hetwelk door Venukoff wordt gegeven in de Revue de Béographie 1). Een groot gedeelte daarvan heeft betrekking op Europeesch Rusland en op de geschiedenis van de opnemingen in de verschillende gedeelten van het rijk; maar ook de kaarten van de tot Azië behoorende Inden, alsmede die van de daaraan grenzende rijken of gedeelten ervan vorden besproken. De algemeene kaart van Russisch-Azië, op de schaal van 1:4,200,000, waarop ook de omliggende landen gedeeltelijk voorkomen, is wel de beste die er bestaat van Noordelijk Azië. Datzelfde geldt van Matoezofski's prachtige kaart van het Chineesche Rijk 2).

Ook wordt door den schrijver de aandacht gevestigd op de geweldige vorderingen der hydrographische cartographie, sedert 1850. Van de Rustand begrenzende zeeën en van vele meren en rivieren bestaan thans beer goede kaarten, van welke de tegenwoordig bij de zeevaarders in gevruik zijnde worden opgenoemd.

Ten slotte nog enkele woorden over Voor-Azië, nl. Arabië, Syrië en Palestina, het Kaukasusgebied en Armenië met Klein-Azië.

Voor het onderzoek van Palestina wordt nog altijd veel door de Engelchen gedaan, waarbij majoor Conderzich, door zijne topographische pnemingen, verdienstelijk maakt. In het vorige jaar ontving ons Genootchap ten geschenke een door hem geschreven verslag van de belangrijkte resultaten zijner werkzaamheden³). Het werk bevat, behalve eene istorische inleiding, met opgaven van bronnen, overzichten van de onterzoekingen in Judea, Samaria, Galilea, Moab, Gilead en Noordelijk

¹⁾ M. Venukoff, Progrès de la cartographie dans l'empire russe. Rev. géogr. sril 1889, p. 290. Uittreksel daarvan in Sc. G. Mag. 1889, p. 379.

Vlg. de bespreking van Matoezofski's werk over China, door F. G. Kramp, den vorigen jaargang van ons tijdschrift, Versl. en Meded. p. 54 vlg.

⁸⁾ Palestine by Major C. R. Conder, Leader of the Palestine Exploring expediture. London, Philip & Son, 1889. Vlg. ook over de uitgave van Conder's opneminary, PM. 1889, p. 277. Zie verder de tijdschriftartikelen over Syrië en Palestina in ML. '89, n°. 664-678 en 2783-2800.

Syrie, alsmede de resultaten daarvan, terwijl in een aanhangsel o.a. de ligging wordt opgegeven van plaatsen, die in het Oude en het Nieuwe Testament worden genoemd en welker ligging met zekerheid bekend zon zijn. De kaarten en de talrijke afbeeldingen zijn, over het geheel, goet uitgevoerd.

Van het door Prof. Wunsch, in 1883, ingestelde onderzoek in he gebied der oostelijke bronrivier van den Tigris geeft hij in Pet. Mitt een verslag, waaruit blijkt dat die rivier Buhtan-Bohtan- of Bohtan-Čaj, en geheel in den bovenloop Mirjem-Čaj geheeten, onder de benaming Čaj (waarmede de Koerden eene rivier bedoelen) ontspringt onder de vaste sneeuwbedekking van de Sinur Dagh. De Kohran-su is een linker zijnviertje van de Čaj en ontspringt een weinig ten W. van deze 1).

Omtrent de onderzoekingen, in 1888 in het Kaukasusgebied gedaan, werden door Mummery, Holder en Dent mededeelingen gedaan in de Proceedings²), terwijl de bekende Hongaarsche onderzoeker van het Kaukasus-gebergte, Moriz von Déchy, eene beschrijving geeft van het massief van den Adai-Choch, in den Centralen-Kaukasus³).

In de mededeelingen omtrent de onderzoekingen, gedurende het jaar 1889 in den Kaukasus gedaan ⁴), en die voor een deel het gevolg waren van de nasporingen betreffende het lot der verongelukte reizigers Donkin en Fox ⁵), wordt beweerd dat de kaart van den Adai-Choch, gelijk die door Déchy wordt gegeven, voor een groot deel onjuist is. Slechts die gedeelten welke door Déchy zelf bezocht zijn, nl. het gebied van den Ceja-gletscher (Zei-gletscher op Déchy's kaart), alsmede de bergpassen van Dargom en Skatykom, waarbij de nieuwere Russische opnemingen

¹⁾ Das Quellgebiet des östlichen Tigrisarmes. Begleitworte zur Originalaufnahme von Prof. Jos. Wünsch. PM. 1889, p. 115 en 189. Met kaart (Taf. 9) op 1:400,000

²⁾ Further Explorations in the Caucasus. 1. The Ascent of Koshtantau. By A. Mummery. 2. The Peaks of the Bezingi Glacier. By H. W. Holder. 3. No on the last Journey and Photographs of Mr. W. F. Donkin. By C. T. Dent. Pro 1889. p. 351. Met kaart van den Elbruz en den Centralen Kaukasus.

³⁾ Das Massiv des Adai-Choch im zentralen Kaukasus. Von Moris von Déch PM. 1889, p. 209 vlg. Met kaart. T. 18.

Zie ook van denzelfden schrijver: Neuere Forschungen und Bergreisen Kaukasischen Hochgebirge. Mitteil. Deutsch. u. Oesterreich. Alpenverein 1889, p. 4 Alsmede: D. W. Freshfield, The early explorers of the Caucasus, Alpine Journal 1889, XIV, p. 314—318.

⁴⁾ Explorations and Ascents in the Caucasus in 1889. Proc. 1889, p. 671 vlg. Zie of PM. '90, p. 57.

⁵⁾ Vlg. Proc. '89, p. 559.

is grondslag zijn gebruikt, worden nauwkeurig voorgesteld. Het overige in de kaart, met inbegrip van de paden en bergpassen tusschen Kanunta in Zenaga, is geteekend naar de Russische 5-werst kaart, welke voor dit gebied geen waarde heeft.

Het schetskaartje op p. 675 der Proceedings is moeielijk te vergelijken net de kaart in Pet. Mitt., daar er geen meridianen en parallellen op zijn. De overzichtskaart op p. 404 der Proc. is zeer duidelijk en uitvoetig genoeg om daarop de in 1889 gedane tochten en bergbeklimmingen e volgen; deze werden verricht door Freshfield, Powell, Dent in Woolley. Opmerkelijk is het dat de inboorlingen, die men als giden had meegenomen, de reizigers onveranderlijk in den steek lieten, zoodha de werkelijke moeielijkheden begonnen, zoodat het geloof alsof de bewoner van den Kaukasus of de Himalaja een geboren gids zou zijn woor het bezoek der gletschers of der hooge bergstreken, als geheel ongegrond beschouwd moet worden.

Onder de werken over het Kaukasus-gebied zij vooreerst de aandacht gevestigd op dat van Weidenbaum¹), waarin mededeelingen worden gedaan over de orographie en de hydrographie van den Kaukasus, de administratie en de kolonisatie der verschillende landstreken, de bevolking mz., terwijl er verder marschroutes in worden aangegeven voor het doen aan tochten in eenige gedeelten van het gebied. Déchy wijst er, in zijn beferaat, op dat hetgeen de schrijver zegt over het algemeen wel juist is, maar dat er zoovele zaken in het werk niet vermeld zijn, die door de onderzoekingen der laatste jaren bekend zijn geworden. Zoo wordt volstrekt niet gesproken over het centrale gedeelte van het Kaukasus-gebergte, met nijn hooge toppen Koschtantau, Dychtau, Schkara, Tetnuld enz., een gebied dat 100 E. mijlen lang en 80 à 100 E. mijlen breed is. Ook over de geologische gesteldheid wordt niets gezegd.

Iets dergelijks zegt ook Dingelstedt over dat werk²); het is een retrouwbare gids voor hen die de meest bezochte gedeelten van den kaukasus bereizen, met geen ander doel dan het verkrijgen van een zeer legemeen overzicht van de gesteldheid des lands, de bewoners en de oornaamste historische gebeurtenissen. De beschrijving welke Reclus

¹⁾ E. Weidenbaum, Gids door den Kaukasus. Samengesteld in opdracht van den Fouverneur-Generaal van het Kaukasus-gebied. Gr. 8°, 484 pp. Met kaart. Tiflis 1888.-Russisch). (Refer. van Déchy, PML. '89, n°. 652).

²⁾ The geography of the Caucasus. By Victor Dingelstedt. Sc. G. Mag. 1889, A. 848.

in het tweede hoofdstuk van het zesde deel zijner Geographie Universelli van het Kaukasus-gebied geeft, is, uit een geographisch oogpunt, beter al mogen daaraan ook gebreken kleven, ten gevolge van de uiteenloopend waarde der bronnen welke door hem zijn gebezigd en de omstandigheid dat hij de streken, welke hij beschrijft, niet persoonlijk heeft bezocht 1). Dingelstedt geeft vervolgens een beknopt overzicht van de voornaamste bronnen betrekkelijk de geographische gesteldheid van den Kaukasus, alleen met het doel om den lezer een denkbeeld te geven van den arbeid die daar verricht is. Blijkt het reeds uit zijn artikel hoevele werken over dat gebied in het Russisch zijn geschreven, zoodat de kennis dier taal voor eene volledige bestudeering der verschillende onderwerpen, welkt door hem worden besproken, onmisbaar is, ook met de nu nog te noemen werken is zulks het geval. Vooreerst heeft men de opgaven van het statistisch comité van den Kaukasus, betreffende het gouvernement Elizabethpol en het gebied van Kars, welke worden overgenomen in het referaat van Seidlitz²) en in een beknopt overzicht dat die schrijver in het Sc. Geogr. Mag. geeft 5); ten andere het overzicht der geologische onderzoekingen over 1887, dat door Déchy zeer uitvoerig wordt besproken 4); eindelijk een opstel van Chatisjan over de gletschers van den Kasbek gedurende het tijdperk 1862-1887, waaruit blijkt zij toen aan het afnemen waren, met uitzondering van eene periode van geringe toeneming omstreeks 1876 5). Verder zijn de tijdschriftartikels te vinden in PML. 1889 no. 653-661 en 2759-2783.

Van Klein-Azie werd eene wandkaart der oudheid uitgegeven door

¹⁾ Vlg. mijn vorig overzicht, p. 401, waar het Kaukasus-gebied bij Europa is behandeld.

Later kwam mij in handen n°. 3 van PM. 1890, waarin V. Déchy op p. 85 een overzicht geeft van de nieuwe opnemingen in het hooggebergte van den Kankasus, door den Russischen generalen staf.

²⁾ Kankasisch Statistisch Comité, Gouvernement Elizabethpol. Statistische opgaven betreffende de bevolking. 8°, XVII, 475, 20 en 56 pp. Met kaart. (Russisch). Tiflis 1888. — Het gebied van Kars. 8°, 294 pp. (Russisch). Tiflis 1889. (Ref. van Seidlitz, PML 1889, n°. 2782a en 2782b).

⁸⁾ The province of Elizavetopol. By Nic. de Seidlitz. Sc. G. Mag. 1889, p. 360

⁴⁾ Geologische onderzoekingen in het Kaukasus-gebied in 1887. Izwest. der Kaukas afdeeling van het K. Russ. Aardr. Gen. IX, p. 418—448. (Refer. van Déchy, PML 1890, n°. 4).

⁵⁾ G. Chatisjan, De Gletschers van den Kasbek gedurende het tijdperk 1863-1º87. Izw. 1888, XXIV, p. 322-347 (Ref. van Ed. Brückner, PML. 1889, n°. 2777).

L. Kiepert¹), die op dit gebied reeds sinds lang een gevestigden nam heeft, terwijl over de overige landen van Voor-Azië nog genoemd nogen worden het werk van De Damas over Armenië en dat van Deflers over zijne reis naar Jemen in 1887²).

Afgesloten half Juni.

EUROPA.

Met het oog op den grooten omvang dien dit overzicht reeds heeft ekregen, zal ik het verdere gedeelte zoo beknopt mogelijk behandelen n mij, in vele gevallen, bepalen tot het noemen der publicaties, zonder zeer. Onder de werken van algemeenen aard vermeld ik de uitmuntende zandkaarten van Europa en van verschillende landen van dat werelddeel, oor R. Kiepert, alsmede die van Sydow-Habenicht³); de geogische kaart van Europa, door Prestwich⁴); Baur's en Handtke's ieuwe kaarten van Europa, met de landen aan de Middellandsche zee⁵);

¹⁾ H. Kiepert, Wandkarte von Alt-Kleinasien. Sechs Blätter in 1:800,000. Bern, D. Reimer, 1888. (Ref. v. Van Kampen, n°. 647). — Tijdschriftartikelen in PML. 889. n°. 2747—2759).

³⁾ Le Père de Damas. Coup d'oeil sur l'Arménie à propos d'une mission de la comp. e Jésus, ouverte en Asie mineure, etc. Paris, Miss. Cathol., 1888. 8°, II, 602 pp. (Ref. an Lullies, PML. '90, n°. 3).

A. Deflers, Voyage au Yemen. Journal d'une excursion botanique faite en 1887. P, 246 pp. Paris, Klincksieck, 1889. Pr. 12 fr. (Refer. van Schweinfurth, PML. 1890, P. 5).

^{. 3)} R. Kiepert, Schul-Wand-Atlas der Länder Europas. 18 Karten. Berlin, D. leimer, 1881-88. 1. Stumme physikalische Ausgabe. 2. Politische Ausgabe. Pr. 105 M. Refer. van Vogel, PML. 1889, n°. 154).

Sydow—Habenicht, Methodischer Wandatlas. No. 2 Europa 1:8,000,000. 12 1. Gotha, Justus Perthes, 1888. Pr. 12 M., auf Leinw. in Mappe 18 M., mit Stab und Ringe 21 M., lack. 24 M.

⁴⁾ J. Prestwich, Geological Map of Europe. 1:10,000,000, 1880. (Refer. van apan, als boven, no. 157), Vgl. ook over de verschillende bestaande geologische kaaren der Europeesche landen het opstel: Eine geologische Karte von Europa von Heinr. eek er. ZWG. VII, p. 488.

⁵⁾ C. F. Baur, Neue Karte van Europa, nebst Nordafrika, Aegypten, Syrien, leinasien, Kaukasien etc. 1: 3,000,000. 6 Bl. Chromolith. Stuttgart, Maier, 1889. Pr. 8 M. F. Handtke, Generalkarte von Europa. 1: 9,350,000. 32 Aufl. Glogau, Flemming, 389. Pr. 1 M.

Bijzonder aan te bevelen zijn ook Vogel's kaarten in 4 bladen (sch. 1:1,500,000) bet naamregister, van verschillende landen van Europa: Frankrijk, Oostenrijk-Honarijë, Duitschland, Italië, Spanje. Pr. 6 M. Gotha, Perthes.

de reeds in mijn vorig overzicht, p. 397 vlg., besproken beschrijvingen der landen van Europa, nl. van de Britsche eilanden en de Scandinavische landen, door Friedrich Hahn; de beschrijving van de meeste Europeesche landen buiten Frankrijk, door Vidal-Lablache¹); Dubois' oeconomische geographie van Europa²); het door Bertrand gegeven overzicht van de eruptieve gesteenten in ons werelddeel³) en eindelijk de beknopte algemeene beschrijvingen van Europa, door Holwerda en Cortambert⁴).

Het werk van Dubois is eene voortzetting van zijne: "Géographie tennomique de la France," 18°, XVI en 55° pp. Paris, Masson, 1889. (Ref. n°. 123 in PML. 1889), waarin ook de kolonien van Frankrijk uitvoerig behandeld worden. Datzelfde is ook het geval met het door het ministerie van landbouw uitgegeven werk over de landbouwstatistiek in Frankrijk en zijne kolonien 5). De verschillende stelsels van irrigatiewerken in Noord- en Midden Europa werden beschreven door Van Hasselt en De Koning 4).

De litteratuur over Rusland bepaalt zich tot tijdschriftartikelen; over de bevolking schreven o.a. Hunfalvy, Remezofen Anoetsjin⁷,

¹⁾ P. Vidal-Lablache, Etats et nations de l'Europe autour de la France. 12°, 567 pp. Paris, Delagrave, 1889. (Refer. van Supan, PML. '89, n°. 2058).

²⁾ M. Dubois, Géographie économique de l'Europe. 18°, XV en 688 pp. Paris, Masson, 1889. (Als boven, n°. 2074).

⁸⁾ M. Bertrand, Sur la distribution géographique des roches éruptives en Europe. Bull. Soc. géol. de France, 1888. Sme série, t. XVI, p. 573—617. (Ref. van Keilhack, n°. 171).

⁴⁾ J. Holwerda, Europa. Leerboek ten dienste van hoogere burgerscholen. 8°,217 pp. Tiel, Mijs, 1889. Pr. f1,10. (Ref. TAG. '89, M. p. 477).

R. Cortambert, Géographie générale de l'Europe. 12°, 260 pp. Paris, Hachette & Cie. 1888. Pr. fr. 2. Vlg. verder PML. 1889, n°. 154—174, n°. 2050—2075.

⁵⁾ Statistique agricole de la France (Algérie et Colonies), publiée par le Ministre de l'Agriculture. Résultats généraux de l'enquête décennale de 1882. Nancy, Berger-Levrant et C°, 1887. (Ref. van Metzger, PML. '89, n°. 122).

⁶⁾ J. van Hasselt en De Koning, Bevloeiingen in Noord- en Midden-Europa. Rapport omtrent eene reis tot bezichtiging van irrigatie-inrichtingen. 8°, 112 pp., 16 platen. Nijmegen, Thieme, 1889. Pr. f 12,50.

⁷⁾ P. Hunfalvy, Die Völker des Ural und ihre Sprachen. Ung. Rev. 1888. (Ref. v. Regel, PML. '89, n°. 2577).

N. W. Remezof, Schetsen uit het leven der wilde Basjkieren. 2de uitg. 8°, IV. 806 pp. Moskau 1889. (Russ.). (Ref. van Seidlitz, PML. '89, n°. 2579).

D. Anoetsjin, Over de geographische verdeeling der mannelijke bevolking van Rus-

over de geologische gesteldheid, Nikitin, Krotof, Tsjernysjef; over den luchtdruk en de winden Rykatsjef, Rosenthal; over de plantengeographie Herder, Köppen e.a. 1).

Vermelding verdient ook de tocht welke Koeznetsof in 1888 in het Koebangebied gemaakt heeft, hoofdzakelijk met het doel om botanische onderzoekingen in te stellen, waarbij hij ook hoogtemetingen gedaan heeft, door middel van den barometer. Zulke metingen zijn ook in den zuidelijken Oeral verricht door Antonof, en, evenals de zooëvengenoemde, door generaal Von Tillo berekend³).

Ten slotte vestig ik de aandacht op een opstel van Gelcich over de historische geographie der Zwarte Zee³), waarin hij den oorsprong van den naam dier zee tracht te vinden.

Over Zuid-Europa valt het volgende mede te deelen. De nog zoo gebrekkig bekende landen Bosnie, Herzegowina en Montenegro zijn in 1888 en '89 bereisd door M. v. Déchy, S. Chikofen Dr. O. Baumann 4); eerstgenoemde wilde de bergketens leeren kennen, die in Bosnie en Herzegowina, de voortzettingen der Alpen vormen 5); Baumann hield zich hoofdzakelijk met topographische studiën in Montenegro bezig.

Onder de grootere werken over het Balkanschiereiland zijn belangrijk Asboth's uitgebreide en grondige beschrijving van Bosnië en Herzegowina 6); het reeds in ons tijdschrift besproken werk van Gopčevičover Servie en de Serven 7); Millet's overzicht van de oeconomische

kand, naar de lichaamsgrootte enz. 164 pp. met 10 kaarten. Zap. K. Russ. Geog. Gen. St. Petersb. 1889. (Russ.). (Ref. van Kirchhoff, n°. 2576).

Daar de artikelen van de in den tekst genoemde schrijvers bijna alle in Russische tijdschriften voorkomen, vermeen ik te kunnen volstaan met den belangstellende verder te verwijzen naar PML. '89.

²⁾ PM. '89, p. 228. Izwestija 1889, XXV, p. 135 vlg. en 170 vlg. Vlg. ook: Geaeralmajor A. v. Tillos hypsometrische Karte des europäischen Russland, von Dr. Carl Diener. PM. '90, p. 156. Dit artikel kwam mij eerst in handen toen het bovenstaande geschreven was. Ik vestig er bijzonder de aandacht op.

³⁾ Zur historischen Geographie des Schwarzen Meeres. Von Eugen Geleich. MGW. '89, p. 430.
4) PM. '89, p. 298.

⁵⁾ Zie: Alpine Journal 1889, XIV, p. 417.

⁶⁾ J. v. Asboth, Bosnien und die Herzegowina. Lex. 8°, 488 pp. met statistische tabellen en 4 kaarten. Weenen, Hölder, 1888. Pr. 16 M. (Ref. van Supan, PML. 1889, a°. 545).

⁷⁾ Sp. Gopčević, Serbien und die Serben. Bd. I. Das Land etc. (Vlg. TAG. 1888, M. p. 840 en het refer. van Sopan PML. 1889, n°. 546).

toestanden en den handel van Servië 1) en de Duitsche vertaling van Boué's werk: La Turquie d'Europe (1840), dat wel is waar een der voornaamste bronnen voor de kennis van dat rijk vormt, maar dat uit den aard der zaak, eenigszins verouderd is, terwijl men bij de nieuwe bewerking geen gebruik heeft gemaakt van de sedert verschenen litteratuur, daar het werk — gelijk Supan zegt — in dat geval geheel opnieuw geschreven had moeten worden 2).

In aansluiting aan hetgeen ik in mijn vorig overzicht (p. 402) over de kartographie van Zuid-Europa heb medegedeeld, vestig ik thans de aandacht op Vogel's artikel over de nieuwe kaart van het Balkan-schiereiland in Stielers Handatlas³). In aanmerking nemende dat zoowel door de Oostenrijkers en de Russen, na 1877, als door de regeeringen der kleine staten van het Balkan-schiereiland (met name die van Servie) en door bijzondere instellingen en personen, in de laatste jaren zeer veel voor de kartographie van het schiereiland gedaan was, scheen thans het geschikte tijdstip aangebroken voor eene algeheele vernieuwing en omwerking der in Stielers atlas voorkomende kaarten van het Balkan-schiereiland en Griekenland. Zulks heeft dan ook nu plaats gehad en in de plaats der bestaande kaarten op de schaal van 1:2,500,000 en 1:1,850,000, is eene groote kaart in vier bladen gekomen, op de veel grootere schaal van 1:1,500,000.

Vogel's artikel heeft, behalve door de uiteenzetting van hetgeen betrekking heeft op de totstandkoming der kaart, ook waarde door de litteratuuropgave betreffende de kaarten en werken welke bij de samenstelling ervan gebezigd zijn.

De algemeene kaart van het Balkan-schiereiland door Sohr 4) berust

¹⁾ R. Millet, La Serbie économique et commerciale. 8°, 848 pp. 2 kaarten. Paris et Nancy, Berger-Levrault et Cie, 1889. Pr. 5 fr. (Refer. van Regel, als boven, n°. 2615).

²⁾ A. Boué, Die europäische Türkei. 2 Bde. Gr. 8°, I Bd. XI en 674 pp. H Bd. 564 pp. Wien, Tempsky, 1889. (Ref. van Supan, n°. 2589).

³⁾ Neue Karte der Balkanhalbinsel in Ad. Stielers Handatlas. Vier Blätter in 1:1,500,000. Von C. Vogel. PM. 1890, p. 42.

Vlg. ook noot 4 op p. 402 van het vorige overzicht. Van de triangulatie van Boelgarijë wordt door Lebedef een overzicht gegeven, in de Zapiski der Topogr. ast van den gener. Staf te St. Petersburg. Zie het uittreksel in PML. 1889, n°. 2588.

⁴⁾ K. Sohr, Generalkarte der Balkanhalbinsel in 1;1,700,000. Glogan, C. Fleming, 1889. Pr. 1 M. (Ref. v. Vogel, PML. 1889, n°. 2584).

Hetgeen in den tekst over deze kaart wordt gezegd is ontleend aan het referaat, dest

ep verouderd materiaal, in vergelijking met de bovengenoemde in Stieler's talas. De spoorwegen en stoombootverbindingen zijn er op aangegeven.

Van gewicht voor de kennis der geologische gesteldheid van den Balkan zijn Toula's onderzoekingen aldaar in het jaar 1884, waarvan hij in het vorige jaar verslag heeft gedaan '). Dergelijke onderzoekingen zijn ook verricht door Bittner in het Narenta-dal, tusschen Konjica en Jablanica²) en door Ehrenburg op Milos³), terwijl Steeb eene orographische indeeling der gebergten van het Balkan-schiereiland voorstelt, welke geheel gegrond is op de insnijdingen en waarbij dus geen rekening is gehouden met de geologische gesteldheid 4). Op eene der bij het opstel gevoegde kaarten, worden de bergstelsels met verschillende kleuren sangegeven; de Drina en hare rechter zijrivier de Lim vormen de grens tusschen het westelijke en het oostelijke Illyrische bergland, de Boelgaarsche Morawa scheidt dit laatste van het Macedonische gebergte, dat op zijn beurt door de Zwarte Drin van het Albaansche kustgebergte en door de Struma van het Rhodope-gebergte wordt gescheiden; de grens tusschen dit laatste en het Balkanstelsel wordt gevormd door de Maritza. Tegenwoordig, nu de geologische gesteldheid der gebergten bij de beschrijving zoozeer op den voorgrond wordt gesteld, is het niet waarschijnlijk dat Steeb's indeeling vele aanhanger's zal vinden. De uitvoerige en zeer duidelijke hypsometrische kaart, welke bij het opstel behoort, is eene groote aanwinst.

ik de kaart niet in handen heb gehad; het is trouwens in overeenstemming met hetgeen Lüddecke over Handtke's kaart van Afrika zegt (PML. '90, n°. 119, vlg. ook p. 886 in afl. 2 van dezen jaargang van ons tijdschrift). Men bedenke dat die kaarten zeer goedkoop zijn en dat zij toch altijd voor het groote publiek, voor zoover het slechts een algemeen overzicht van een land- of werelddeel verlangt, alleszins voldoende zijn. Het spoorwegnet is bijv. op Sohr's kaart volledig ingeteekend; de spoorwegverbinding van Feteschti naar Tschernawoda bestaat evenwel nog niet.

¹⁾ F. Toula, Geologische Untersuchungen im zentralen Balkan. Denkschr. Wiener Ak. Wiss. Math.-nat. Kl. 1889. Bd. LV, 108 pp., 1 kaart 1:800,000. Wien, Tempsky, 1889. Afzonderlijk verkrijgbaar. Pr. 12 M. (Ref. v. Supan, PML. '89, n°. 2609).

²⁾ A. Bittner, Geologische Mitteilungen aus dem Werfener Schiefer-und Tertiärgebiet von Konjica und Jablanica an der Narenta. Jahrb. Geol. Reichsanst. Wien 1888. Bd. XXXVIII, p. 321—42. (Ref. van Supan, PML. 1889, n°. 2606).

³⁾ K. Ehrenburg, Die Inselgruppe von Milos. 8°, VIII + 120 pp., 2 kaarten. Leipzig, Fock, 1889. Pr. 4,50 M. (Ref. v. Partsch, n°. 2611).

⁴⁾ Die Gebirgs-Systeme der Balkan-Halbinsel. Von Ch. Ritter von Steeb. MGW.1889, p. 257. Met twee kaarten op de schaal 1: 3,000,000. (Ref. v. Supan, PML. 1889, n°. 2605).

Over het Illyrische bergland en Montenegro zijn ook afzonderlijke stadiën verschenen, met bijbehoorende kaarten, op welke de bergketens naarmate van hare hoogte, door zwarte lijnen van verschillende dikte zijn voorgesteld, terwijl ook daarbij uitsluitend over de orographische gesteldheid, volstrekt niet over de geologische, wordt gesproken 1).

Eindelijk vermeld ik, wat Griekenland betreft, de artikelen van Philippson over zijne reizen in den Peloponnesus²) en de overzichten betreffende den buitenlandschen handel van Griekenland, welke door het Statistisch Bureau van het Ministerie van Financiën te Athene worden uitgegeven³).

Bij Italië valt de aandacht vooreerst op de verschillende kaartwerken: de groote topographische kaart, waarvan het grootste gedeelte reeds voltooid is 4), de door het landbouwdepartement uitgegevene hydrographische kaart van Italië 5), eenige gedeelten der geologische kaart, welke in bewerking is 6), de kaarten van Italië, door Bamberg en Guido Cora 7), Kiepert's Wandkaart van het oude Latium 8), de reeds in mijn vorig

¹⁾ Der westliche Theil des illyrischen Gebirgslandes. Von L. B. B. MGW. 1889, p. 415. Met kaart. T. XXI.

Montenegro. Von Karl Kandelsdorfer. Ibid. p. 493. T. XXII.

²⁾ A. Philippson, Berichte über seine Reisen im Peloponnes. Verh. Ges. Erdk. Berlin 1887, p. 409 en 456; '88, p. 201 en 314. (Ref. van Supan, PML. 1889, n°. 556).

— Ueber Besiedelung und Verkehr in Morea. Ibid. 1888, p. 442. (Als boven, n°. 559).

³⁾ Uitvoerige overzichten daarvan, betrekking hebbende op de jaren 1886, '87 en '88, vindt men in PML. 1889, n°. 560 (door Partsch), 561 (door Philippson) en 2618 (door den laatstgenoemde).

⁴⁾ Vlg. in Behm's (Wagner's) Geogr. Jahrb. 1838, XII, de overzichtskaart (op p. 23 en 23 van het aanhangsel), waarop men ziet dat van de Carta del Regno d'Italia op de schaal 1:100,000, geheel Zuid-Italië (met Sicilië), een deel van Midden-Italië (tot Civita Vecchia) en het gebied om de golf van Genua (tot ongeveer de lijn Aosta-Novara-Parma) gereed zijn.

⁵⁾ Direzione generale d'agricoltura, Carte idrografica dell' Italia. 1:100,000. Met tekst. 8°, 280 + 70 pp. (Ref. van Vogel, PML. 1889, n°. 2626).

⁶⁾ Carta geologica della Campagna romana con le regioni limitrofi. 6 Bl. 1:100,000. Tekst 8°, 23 pp. (Ref. van Fischer, n°. 2681).

⁷⁾ K. Bamberg, Schulwandkarte von Italien. 1:800,000. Berlin, Chun, 1888. Pr. 10 M. (Aangekondigd in Zeitschr. f. Schulgeogr. 1889, X, p. 254).

G. Cora, Carta altimetrica et barometrica dell' Italia 1: 2,000,000. Bull. Inst. internat. de stat. Rome 1888, III, 2, met tekst p. 166—175. (Ref. v. Supan, PML 1889, n°. 565).

⁸⁾ H. Kiepert. Wandkarte von Alt-Latium in 4 Blättern. 1:125,000. Berlin, Reimer 1888. Pr. 9 M. (Ref. van V. Kampen, n°. 572).

erzicht genoemde nieuwe kaart van Italië in Stieler's handatlas, door ogel 1), en de nieuwe kaart van Italië, op de schaal van 1:500,000 2). Onder de algemeene werken over verschillende gedeelten van Italië pem ik de beschrijving van Noord-Italië door Léris, waarbij zeer fraaie ustraties gevoegd zijn 3); die van den Gran Sasso d'Italia door Abbate 4); iorentini's monographie van de provincie Bergamo 5); de werken van rédé, Ross en Sombart 6). De arbeid van den laatstgenoemde is wel schikt om ons een denkbeeld te geven van den achteruitgang van geel zuidelijk Italië, waar de bevolking ten platten lande afneemt en de ndbouw steeds meer in verval geraakt. De Campagna had in de oudheid ne welvarende bevolking die zich met landbouw bezighield; in den keirtijd had men daar bloemen-, oost- en groenteteelt, in plaats van den oegeren graanbouw. Met den achteruitgang van Rome ging die van de ampagna gepaard; het grondbezit kwam in handen van de kerk, graanbuw kreeg weder de overhand. Het leenstelsel en de onophoudelijke oelingen, tengevolge waarvan de bevolking meer en meer in versterkte aatsen ging wonen en ook afnam, legden den grond voor de tegenoordige toestanden. Alle pogingen om daarin verbetering te brengen zijn t dusver vruchteloos geweest; alleen de staat kan daarin op den duur agen ⁷).

Vele grootere en kleinere werken van den laatsten tijd hebben betrek-

¹⁾ Vlg. TAG. 1889, M. p. 402.

²⁾ Nuova · Carta d'Italia alla scala di l a 500,000" dell' Istituto geografico milire, Firenze 1890. Von C. Vogel. PM. 1890, p. 54.

⁽³⁾ G. de Léris, L'Italie du Nord. Paris, Quantin, 1889. 4°, XI + 469 pp., et illustraties. Pr. 25 fr. (Aangekondigd in Proc. 1889, p. 115).

⁽⁴⁾ Enrico Abbate, Guida al Gran Sasso d'Italia, pubblicata per cura della trione di Roma del Club Alpino Italiano. Roma 1888. 12°, VII + 224 pp., kaarten, atte gronden en illustraties. (Als boven, p. 51).

⁵⁾ L. Fiorentini, Monografia della provincia di Bergamo. 4°, 252 pp., met kaarten. Bergamo 1888. Pr. 12 lire.

⁶⁾ P. Frédé, Excursion en Sicile. 8°, 227 pp. Paris, Delagrave 1888.

<sup>J. Ross, The land of Manfred. 8°, 872 pp., met kaart. London, Murray 1889.
r. 10 sh. 6 d. (Aangekondigd in Athenaeum 1889, n°. 3214, p. 692; Academy 1889, 425; Nature 1889, XL, p. 413).</sup>

W. Sombart, Die römische Campagna. 8°, 182 pp. Leipzig, Duncker & Humlot, 1888. Pr. 4,20 M. (Ref. v. Fischer, PML. 1899, n°. 2702).

⁷⁾ Vlg. ook: W. N. Beauclerk, Rural Italy; an Account of the present Agrilitural Condition of the Kingdom. London, Bentley & Son. 1888. 8°, IV en 255 pp. 2. 9 sh. (Aangekondigd in Proc. 1889, p. 813).

king op de in Italië zoo veelvuldig voorkomende aardbevingen 1) en op de geologische gesteldheid en het vulcanisme van het schiereiland.

Ik wijs o. a. op het werk van Zoppi over de geologische en mineralogische gesteldheid van het gebied van Iglesias op Sardinië 3), alsmede op Brauns' onderzoekingen betreffende den bekenden Serapis-tempel van Pozzuoli 3), die hem tot het besluit gebracht hebben dat een achtereenvolgens dalen en rijzen van den bodem, waarop die tempel gebouwd werd, hoogst onwaarschijnlijk is, terwijl ook in het gebied dat er nabij ligt, geen sporen van dergelijke dalingen en rijzingen zijn te bekennen. Door aan te nemen dat men hier te doen heeft met een zoutwaterbewaarplaats voor visschen en schaaldieren (eene piscine), zou men de verschijnselen aan de zuilen van het gebouw, welke als bewijzen van daling werden beschouwd, ongedwongen kunnen verklaren.

Tot besluit vermeld ik nog de studiën van den uitstekenden Marinelli over hoogte-metingen in het gebied van Venetië en in de Euganaeën 4).

Spanje en Portugal zijn op kartographisch gebied nog lang zoo ver niet als Italië; van de "Mapa de España", op de schaal van 1:50,000, zijn nog slechts enkele bladen (Madrid, Toledo) gepubliceerd; de "Carta chorographica de Portugal", op de schaal van 1:100,000, is voor het grootste gedeelte gereed 5). In Sydow-Habenicht's verzameling van schoolwandkaarten komt het Pyreneesche schiereiland voor, op de schaal van 1:750,000 6).

¹⁾ Zie o. a. over de aardbeving van 28 Febr. 1887 in het gebied der Riviera: n°. 596a, b, c, d, e, in PML. '89, en het grootere werk van A. Issel, Il Terrenote del 1887 in Liguria, 207 pp., met kaart. Genua, Donath, 1888. (Uitvoerig ref. van Fischer, PML. 1889, n°. 2670); alsmede het werk van H. J. Johnston-Lavis, Monograph of the Earthquakes of Ischia, a memoir dealing with the seismic disturbances in that island from remotest times, with special observations on those of 1881 and 1883. London, Dulau & C°., Napels, F. Furchheim, 1885. Pr. 36 M. (Ref. van Ladolph, PML. 1889, n°. 2681).

²⁾ G. Zoppi, Descrizione geologico-mineraria dell' Iglesiente (Sardegna). Gr. 8°, 154 pp. Met afbeeldingen enz., en eene geologische kaart. Rome, R. Uff. Geol., 1888. (Uitvoerig ref. van Fischer, PML. 1889, n°. 2685).

³⁾ D. Brauns, Das Problem des Serapeums von Pozzuoli. Leopoldina, Halle 1888, Heft XXIV, p. 182, 150 enz. (Ref. v. Supan, nº. 2698).

⁴⁾ G. Marinelli, Materiali per l'altimetria italiana. IX Regione Veneto-orientale e Veneta propria. Boll. R. Istit. Veneto di Sc. 1889, V. — Sui colli Euganei, note altimetriche. 8°, 25 pp.-Padua 1888. Atti R. Accad. Sc. Padua 1888, IV. (Ref. van Fischer, n°. 2668 en 2664).

⁵⁾ Vlg. Behm's (Wagner's) Geogr. Jahrb. 1888, XII, het aanhangeel p. 20 en 21.

⁶⁾ Gotha, Perthes, Prijs op linnen 15 M., met rollen 18 M.

Door het "Instituto geografico y estadistico" in Spanje worden, onder biding van kolonel Ibafiez werken uitgegeven, die wel is waar volstrekt biet van zuiver geographischen aard zijn, maar waarin toch veel bouwtoffen worden gevonden welke uit een geographisch oogpunt belang beben. De statistische opgaven zal men altijd met omzichtigheid dienen te gebruiken, vooral wanneer zij in betrekking staan tot het belastingwezen 1). Men vindt in de verslagen van de genoemde instelling ook mededeelingen aangaande de geodetische en astronomische werkzaamheden en de nauwkeurigheidswaterpassingen, in verband met de zgn. internationale aardmetingen 2).

Van groot belang voor de kennis der geologische gesteldheid van het Pyreneesche schiereiland zijn de resultaten der onderzoekingen van Macpherson³), Bertrand en Kilian⁴), Lévy en Bergeron⁵) e.a. De Balearen zijn geologisch onderzocht door Hermite, Vidal en Molina⁶). Over het klimaat, meer in het bijzonder den regenval, hebben wij eene bijdrage van Hellman⁷). Overigens bestaat

¹⁾ Reseña geografica y estadistica de España, por la direccion general del Instituto geografico y estadistico. 4°, 251 en 1116 pp., met kaart. Madrid 1388. Pr. 20 pes. (Zie het zeer uitvoerige referaat van Fischer in PML 1889, n°. 624). Memorias del Instituto geografico y estadistico. Dl. VII. Gr. 8°, 748 pp. etc. Madrid 1388. (Als boven, n°. 2711).

²⁾ Vlg. Behm's (Wagner's) Geogr. Jahrb. XII, p. 309-348, over de officiëele karlographie in Europa, en XIII, p. 103, over de vorderingen der internationale aardmeling (de vroegere Europeesche graadmeting). Natuurlijk vindt men daar ook de medeleelingen betreffende alle andere landen van Europa.

³⁾ Macpherson, Relacion entre la forma de las costas de la Península Ibérica, us principales lineas de fractura y el fondo de sus mares. Rev. gen. de Marina 1886, XIX, p. 676 en Bol. Soc. geogr. Madrid 1886, XXI, p. 356, met schetsknart. (Uitvoerig ref. van Fischer, PML. 1887, n°. 222).

I de m. Relación entre la forma de las depresiones oceánicas y las dislocaciones geobgicas. Con versión francesa. Madrid 1888, met 2 schetskaarteu. (Als boven, 1889, nº. 688).

⁴⁾ M. Bertrand et M. Kilian, Mission d'Andalousie. Etudes sur les terrains secondaires et tertiaires dans les provinces de Grenade et de Malaga. Paris 1889. (Als seven, n°. 2726).

⁵⁾ M. Lévy et Bergeron, Mission d'Andalousie. Etude géologique de la Sersenia de Ronda. 4°, Paris, Imp. nat. 1889. Mémoires présentés par divers savants à Acad. des sciences de l'Inst. de France.

⁶⁾ Hermite, Vidal, Molina, Estudios geológicos de las islas Baleares. 4°, 104 pp., met kaart enz. Madrid, Tello 1889. Pr. 15 pes.

⁷⁾ G. Hellmann, Die Regenverhältnisse der iberischen Halbinsel. ZGEB. 1888, LXIII, p. 807-400, met kaart. (Uitgebr. ref. v. Supan, PML. 1889, n°. 641).

de litteratuur uit reisbeschrijvingen en werken van gemengden aardzooals die van Hoffmeister, Word, De Saint-Victor, Field 1) e. a.

Onder de kaartwerken, welke betrekking hebben op Frankrijk, verdienen genoemd te worden de grenskaarten van Mullhaupt en Barré?), de geologische kaarten van Carez en Vasseur³), van Jacquot en Lévy⁴) en van het Ministerie van Openbare werken, de kaart van Saunois de Chevert, waarop de voortbrengselen der verschillende landstreken zijn aangegeven⁵), de kaart, op welke de plaatsing en de indeeling der troepen zijn voorgesteld⁶) en verder de kaarten van verschillende gedeelten van Frankrijk. Het is bijna overbodig hier bij te voegen dat de groote stafkaart van Frankrijk, op de schaal van 1:80,000, welke zich ook in de bibliotheek van ons Genootschap bevindt, sedert 1882 geheel voltooid is; bij gelegenheid van de internationale tentoonstelling van 1889 te Parijs, was er, vanwege de directie der "Service géographique de l'armée", eene afzonderlijke tentoonstelling van instrumenten en van oudere en nieuwere kaarten 7). Dat in Frankrijk de be-

¹⁾ H. Hoffmeister, Durck Süd-Spanien nach Marokko. Tagebuchblätter. 199 pp. Berlin, Wilhelmi, 1888. Pr. 8 M.

Ch. W. Word, Letters from Majorca. 8°, 410 pp. London, Bentley 1888. Pr. 16 sh. (Aangekondigd in Academy, 1889, p. 73).

G. de Saint-Victor, Espagne. Souvenirs et Impressions de voyage. 18°, 34 pp., met kaart. Paris, Dentu, 1889. Pr. 8,50 fr.

H. M. Field, Gibraltar. 8°, 148 pp. London, Chapman & Hall, 1889. Pr. 7 sb. 6 d. (Aangekondigd in Academy, 20 April 1889, p. 268).

²⁾ F. Müllhaupt, Militär- und Verkehrskarte der deutsch-französischen Grenzen 1:1,250,000. Bern, Müllhaupt, 1883. Pr. 1,20 M. — Karte der deutsch-französischen Grenzen. 1:1,250,000. Pr. 1,40 M. — Carte des frontières franco-italiennes-suisses. 1:1,050,000. Pr. 1,20 M.

Barré, Carte stratégique de la frontière franco-allemande pour l'étude de la géographie militaire. 1:1,280,000. Paris, impr. Lemercier, 1888.

⁸⁾ L. Carez et G. Vasseur, Carte géologique générale de la France. 1:500,000. In bladen van 2 à 8 fr. compleet 200 fr. Lithogr. Paris, Comt. Géolog. 1886-88, 1889.

⁴⁾ Jacquot et M. Lévy, Carte géologique de la France. 4 Bl. 1:1,000,000. Paris, Baudry, 1889. Pr. 9,50 fr., op linnen 15 fr., met rollen en gevernist 20 fr. (Assgekondigd in C. R. Ac. Sc. Paris 1888, CVII, p. 798-795).

⁵⁾ G. Saunois de Chevert, Carte économique de la France au point de vue des principales productions naturelles, etc. Paris, Guillaumin, 1889. Pr. 1,50 fr.

⁶⁾ Carte de la répartition et de l'emplacement des troupes de l'armée française pour l'année 1889. 1:1,950,000. Paris, Le Soudier, 1889. Pr. 1,50 fr.

⁷⁾ Service géographique de l'armée, Notice sur les objets exposés. Paris,

regstelling voor de geographie in de laatste twintig jaren zeer sterk is begenomen weet iedereen en de reden daarvan is eveneens algemeen ekend. De Franschen hebben het, tot hunne schade en schande ondersonden, tot welke noodlottige gevolgen de verwaarloozing der geographische bedien voor het jaar 1870, moest leiden. Thans wordt door zeer velen earbeid aan het geographisch onderzoek der verschillende gedeelten van et door de natuur zoo rijk bedeelde land. Het aantal werken over de geographische gesteldheid van Frankrijk neemt dan ook van jaar tot jaar toe. Onder de nieuwere werken van algemeenen aard noem ik die van Vidal-Lablache, Fernandez, Mataigne, Levasseur en Joanne¹).

Vidal-Lablache, wiens werk over de Europeesche staten welke Frankrijk

Bandoin et Cie., 1889. (Ref. van Vogel, PML. 1889, n°. 2352). Daarbij zijn 27 kaarten gevoegd, voorstellende gedeelten van de tentoongestelde, zoodat men zich daarvan inne juiste voorstelling kan maken. Opmerking verdient o.a. de kaart van Frankrijk op 1:50,000, in kleuren, en waarop de arceering vervangen is door de hoogte-lijnen, ij 10 m. onderlingen afstand der horizontale vlakken. Die kaart is echter niet volsoid. Evenals van de stafkaart heeft men ook van de laatstgenoemde eene verkleinde kaart gemaakt op 1:200,000, waarbij de afstand der vlakken op 20 m. is aangenomen, wijl bij de bergteekening, terwille van de duidelijkheid; schuine verlichting is aangenomen.

Vlg. ook het artikel van A. Steinhauser, Zwei Höhenschichtenkarten von Frankreich. MGW. 1889, p. 114, waarin de «Carte du nivellement général de la France" en de «Carte hypsométrique de la France", beide op 1:800,000, worden besproken.

1) P. Vidal-Lablache, Des divisions fondamentales du sol français. Bull. littér. Oct.—Nov. 1888. (Ref. van Camena d'Almeida. PML. 1889, n°. 395).

R. Fernandez, La France actuelle. Gr. 8°, XX en 750 pp. Paris, Delagrave, 1888. (Ref. van Supan, n°. 436).

H. Mataigne, Nouvelle géographie de la France. Kl. 4°, 1499 pp. Montdidier 1887. (Als boven, n°. 2875).

E. Levasseur, La démographie française comparée. Bull. Inst. internat. de Stat. Rome 1888, III, 8, p. 1—103. Met kaart der bevolkingsdichtheid 1:1,600,000. (Als boven, n°. 2418b).

Idem. La population française. Histoire de la population avant 1789 et démographie de la France comparée à celle des autres nations au XIXme siècle. I, 8°, 8 kaarten. Paris, Rousseau, 1889. Pr. 12,50 fr.

P. Joanne, Itinéraire général de la France. La Loire. 12°, 297 pp. — Franche-Comté et Jura, 384 pp. Paris, Hachette, 1888. Pr. 7,50 fr.

Idem. It. gén. de la Fr. Environs de Paris. 12°, 444 pp. 8 kaarten. Paris, Hachette 1889. Pr. 7,50 fr.

Vlg. ook boven p. 696.

omringen, reeds boven werd genoemd (p. 696, noot 1), wil bij het onder wijs niet meer de hydrographie, de geologie, de verkeersgeographie van het land als onderwerpen van afzonderlijke, onderling onafhankelijke beschrijvingen beschouwd hebben, maar de natuurlijke gesteldheid van den bodem, zijne geschiktheid voor den landbouw en voor het verkeen moeten, bij de beschrijving van het land en bij de verdeeling daarvan in natuurlijke gebieden, gezamenlijk als grondslagen dienen. De verdeeling naar de stroomgebieden in scherp van elkander gescheiden afdeelingen in eenzijdig. De schrijver geeft eene verdeeling van Frankrijk in vijf gebieden: 1°. het bekken van Parijs; 2°. het Centraal-plateau; 3°. het Westen; 4°. het Zuiden; 5°. het Saone- en Rhône dal. Men heeft hier eene poging om eenheid te brengen in de geographische beschrijving, naar eene bepaalde leidende gedachte.

Fernandez, de Maxicaansche gezant te Parijs, heeft getracht een getrouw beeld te geven van den maatschappelijken en den oeconomischen toestand van Frankrijk, gegrond op statistische opgaven, zoodat Jules Simon zijn werk "eene beschrijving van Frankrijk in cijfers" noemt.

Mataigne geeft, in zijn uitgebreid werk, de grootte en bevolking, de voortbrengselen, de markten en de voornaamste plaatsen der departementen, volgens de indeeling van arrondissementen en kantons, alles in alphabetische orde.

De werken van den bekenden Levasseur hebben betrekking op de zoo belangrijke bevolkingsstatistiek, waarvan de uitkomsten, gelijk men weet, voor Frankrijk niet bepaald gunstig zijn te noemen; de steeds verminderende toeneming der Fransche bevolking en de vermeerdering van het aantal vreemdelingen (in 1886 waren er 1,126,531, d. i. 3% der bevolking, nl. Belgen, Italianen, Duitschers, Spanjaarden enz.) zijn de meest in het oog vallende verschijnselen. Bij Levasseur's artikel behoort de kaart der bevolkingsdichtheid van Turquan¹).

Joanne geeft, behalve de uitgebreide beschrijvingen in zijn "Itinéraire" enz. van verschillende gedeelten van Frankrijk, ook beknopte van baden havenplaatsen, als Vichy, Boulogne-sur-mer, Dieppe enz. ²)

Werken over de kuststreken van Frankrijk zijn die van M^{me.} de Lalaing en Vattier d'Ambroyse³); het zijn beschrijvingen van

¹⁾ Vlg. PML. 1887, no. 202 en 1889, no. 488.

²⁾ P. Joanne, Vichy et ses environs. 12°, 64 pp. met kaart. Paris, Hachette, 1889 fr. 1. — Boulogne-sur-mer. 12°, 89 pp. Paris, Hachette, 1889, fr. 1.

³⁾ Mmc de Lalaing, Les côtes de la France. De Cherbourg à Saint Nazaire pulla plage. 4°, 320 pp. Paris, Lefort, 1888.

bevolking en de steden en plaatsen welke men langs de kusten vindt. It besluit dit beknopte overzicht van Frankrijk met te wijzen op de regeeringswege uitgegeven overzichten betreffende de binnenlandsche tepvaart in Frankrijk 1), op Frech's geologische beschrijving van Fransche centraal-plateau 2) en de onderzoekingen van Martel in "causses" 3), waaromtrent door hem ook mededeelingen werden gen op het geographisch congres te Parijs in 1889. Verrassend is het ier, zelfs in een land als Frankrijk, waar toch reeds sinds lange jaren temingen verricht zijn, nog werkelijke ontdekkingen gedaan konden den. De rotsmassa's van Montpellier-le-Vieux en de grotten en ondersche wateren der causses waren, tot voor weinige jaren, zóó geheel onend, dat de eerstgenoemde tot het begin van 1889 niet voorkwamen de groote stafkaart van Frankrijk, op de schaal van 1:80,000.

ver België zijn weinig nieuwe publicaties verschenen. De directeur het militair-kartographisch Instituut te Brussel, luitenant-kolonel E. nnequin, gaf in 1888 eene korte beschrijving van de door dat ituut bewerkte en uitgegeven kaarten); van Lemonnier en roy verschenen beschrijvingen van België 5); terwijl er verder en-

Vattier d'Ambroyse, Le littoral de la France. Côtes provençales. 4°, III 101 pp., 4 kaarten. Paris, Palmé, 1889. Pr. 20 fr. (Ref. van Weyhe, PML. 1889, 2897).

Guide officiel de la navigation intérieure. 8me ed. 16°, VIII en 498 pp. Paris, try & Cie 1888. Men kan zich van deze publicatie geen beter denkbeeld vormen neer men haar nl. niet gezien heeft) dan door de lezing van het artikel van H. ller, Die Wasserstrassen Frankreichs in PM. 1881, p. 401 en 449, waarin het lag van 1878, wordt besproken. De daarbij gevoegde fraaie kaart op 1: 3,700,000, limaskt naar de »Carte de la navigation intérieure de la France"; met kleuren zijn pp aangegeven de genormaliseerde en de gekanaliseerde rivieren, de kanalen enz. F. Frech, Das französische Zentralplateau. ZGEB. 1889, XXIV, p. 182—65. van Supan, PML. 1889, n°. 2408).

E. A. Martel, Hydrologie des causses. Traversée de la rivière souterraine de nabias, grottes de Dargilan et des Baumes Chaudes. Rev. géogr. 1889, XXIV, \$1-250. — CR. Ac. des Sc. Paris, 3 Dec. 1888. — Sur la formation géologique l'ontpellier-le-Vieux. Bull. Soc. géol. Paris. 1888, XIV, p. 509—512. — Das Gebiet Causses. Mitt. Deutsch u. Oesterr. Alpenvereins 1888. (Ref. van Supan, als boven, 417 a, b en c).

E. Hennequin, Notice sur les cartes, documents et objets esposés par l'Insticartogr. milit. Ministère de la guerre. 8°, 32 pp. Bruxelles, F. Hayez, 1888. le de la Belgique, Institut. cartogr. militaire. Bruxelles 1888. (Ref. v. Vogel, PML. 1, n°. 443 a, b). De topographische kaart is geheel voltooid.

C. Lemonnier, La Belgique. 4°, 764 pp. 1 kaart. Paris, Hachette, 1888. Pr. 50 fr.

kele geologische en archaeologische verhandelingen werden gepubliceerd. Bij Groot-Britannië en Ierland zijn, behalve de "Ordnance Survey" kaarten, op de schaal van 1:63,000, te vermelden, de kaarten van Shawe en Johnston"), verschillende geologische studiën van Geikie, Clough, Thompson e.a. 2), alsmede beschrijvingen van enkele gedeelten des lands, zooals van Yorkshire door Tait, de Clyde door Millar enz.

Ook bij de Scandinavische rijken zijn het voornamelijk de prachtige topographische en geologische kaarten welke onze aandacht trekken, en die meerendeels in de bibliotheek van ons Genootschap aanwezig zijn 3). Onder de niet in eene der landstalen geschreven werken, waarvan de titels te vinden zijn in PML., noem ik Weitemeyer's beschrijving van Denemarken 4) en het werkje van Van Eeden 5).

Wij zijn thans genaderd tot het Duitsche Rijk, de Oostenrijksch-Hongaarsche Monarchie en Zwitserland, welke landen men kan samenvatten onder den naam Middel-Europa. Naar de natuurlijke gesteldheid kan dat gebied verdeeld worden in de Alpenlanden, de Duitsche Middelgebergten, het gebied der Karpathen en de Noordduitsche laagvlakte.

Aan kaarten is hier geen gebrek; de vervaardiger der bekende groote wandkaart van de Alpen, Von Haardt, heeft eene kleinere overzichtskaart van de Alpenlanden uitgegeven, waarop ook gedeelten der Vogezen, van het Schwarzwald en de Apennijnen voorkomen ⁶); van den to-

L. Leroy, Géographie générale de la Belgique. 8°, 244 pp. Namur, Charlier, 1889, Pr. 2,50 fr.

¹⁾ W. Shawe, Map of England and Wales, compiled from the Ordnance Survey, showing Canals, Navigable Rivers and Principal Railway Lines. 1:683,660. London, G. Philip & S., 1888. Pr. 10 sh.

W. A. K. Johnston, Modern Map of England and Wales. 4 Bl. 1: 443,520. Edinburg, London 1889. Pr. 8 sh., op linnen, in foudraal, 20 sh., op rollen 21 sh. (Ref. van Vogel, PML 1889, n°. 2455, waarin gewezen wordt op de gebrekkige terreinvoorstelling).

²⁾ Zie PML. 1889, no. 2473-83.

⁸⁾ Zie de titels in PML. 1889, n°. 487-497 en n°. 2490-2505.

⁴⁾ H. Weitemeyer, Dänemark. Geschichte und Beschreibung Litteratur und Kunst, soziale und ökonomische Verhältnisse. 8°, VII + 333 pp. 1 kaart. Kopenhagen, Höst, 1889. Pr. 6 M. (Ref. v. Weyhe, PML. 1889, n°. 2525).

Vlg. ook boven, p. 696.

⁵⁾ F. W. van Eeden, Noorderlicht. Bezoek aan Scandinavië in 1887. 8°, 130 pp. Haarlem, Tjeenk Willink, 1888. Pr. f 1,25.

⁶⁾ V. von Haardt, Uebersichtskarte der Alpenländer. 2 Bl. 1:1,000,000. Wien,

cographischen atlas van Zwitserland zijn weder eenige nieuwe bladen verthenen; Michel, Müllhaupt, Ravenstein, Fees en Freytag bebben kaarten van de Alpen, van Zwitserland en van gedeelten van Oostenrijk in het licht gegeven 1). Dan hebben wij Reymann's "Topographische Spezialkarte" van Middel-Europa 2), Vogel's kaart der Duitsch-Oostenrijksch-Russische grenslanden 3), de door het K. K. Milit. Geogr. Institut te Weenen uitgegeven kaart van Middel-Europa 4) en de "Spezialkarte" van Oostenrijk-Hongarije 5), Vogel's kaart van die monarchie in vier bladen 6), Handtke's goedkoope, kleinere kaarten van Duitschland en Oostenrijk-Hongarije 7), Gabler's en Debes' wandkaarten van het Duitsche Rijk en de omringende landen 8).

Hölzel, 1889. In omslag 2,70 M., op linnen in foudraal 6,30 M. (Ref. van Vogel, a°. 2213).

Een leerling van Suess, Dr. Franz Noë, heeft onlangs eene Geologische Uebersichtskarte der Alpen. Wien, Hölzel, uitgegeven. Pr. 10 M. op linnen met rollen 14 M.

- 1) C. Michel, Alpenkarte, westl. Blatt: Schweiz mit den angrenzenden Teilen von Baden. Württemburg etc. 1:600,000. München, Finsterlin, 1888. Pr. 1,40 M.; gekleurd 2,40 M.
- F. Müllhaupt, Grosse Eisenbahn- und Verkehrskarte der Schweiz. 1:300,000. Bern, Müllhaupt, 1888. Pr. 3,50 M.
- L. Ravenstein, Karte der Ostalpen. 1 Bl. Karte der Bayrischen und Algäuer-Alpen. 1: 25,000. Frankfurt, Ravenstein, 1888. Pr. 5 M.
- Th. Fees, Schulwandkarte von Oberösterreich und Salzburg. 1; 200,000. 4 Bl. Chromolithographie. Gr. Fol. Wien, Hölzel, 1889. Pr. 8 M.
- G. Freytag, Touristen-Wanderkarte der niederösterr.-steirischen Alpen und Voralpen. Oestl. Teil. 1:100,000. Wien 1889. (Aangekondigd in Mitt. Deutsch. und Oesterr. Alpenvereins 1889, p. 151).
- Herausgegeben von der Kartogr. Abt. der K. Preuss. Landes-aufnahme. Schaal
 200,000. Berlin, Eisenschmidt 1888 en 1889.
 M. per blad.
 - 5) Sch. 1:1,500,000. Gotha, J. Perthes, 1888. Pr. 2 M.
- 4) Sch. 1:200,000. Wien, Lechner, 1889. (Aangekondigd in Zeitschr. f. Schulgeogr. 1889, p. 285).
 - 5) Sch. 1:75,000. Heliogr. in koper. Wien, Lechner 1889. 0,50 M. per blad.
- 6) C. Vogel. Karte von Oesterreich-Ungarn in 4 Bl. 1:1,500,000. Kupferst. und Kolor. Mit Namensverzeichnis. 8°, 78 pp. Gotha, Perthes, 1889. Op linnen, in linnen-karton. 6 M.
- 7) F. Handtke, Generalkarte von Deutschland. 1:1,825,000. 36 Aufl. Glogau, Flemming, 1889. Pr. 1,50 M. Generalkarte der Oesterr.-Ungar. Monarchie. 1:9,900,000. 22 Aufl. Glogau, Flemming, 1889. Pr. 1,20 M.
- 8) E. Gäbler, Wandkarts des Deutschen Reiches, Niederlande, Belgien, Schweiz und deutsch-österr. Länder. 1:800,000. Polit. physik. Ausg. 6 Bl. Chromolith. Metz, Lang, 1889, per kaart 14 M., op linnen met rollen, 22 M.

Van het Duitsche Rijk heeft men verder de nieuwe bladen der staß kaart 1), die der "Preussische Landesaufnahme" 2), de kaarten van verschillende staten des rijks of van enkele provinciën dier staten 3), alsmede de geologische kaarten van Pruisen en Thuringen, Saksen, Elsass-Lothringen en Beieren 4), enz.

Onder de werken van algemeenen aard over Duitschland verdient onze aandacht het onder redactie van Kirchhoff uitgegeven werk over den aard en den omvang van het reeds verrichte en het nog in te stellen wetenschappelijk onderzoek van land en volk in Duitschland 5); in 12 hoofdstukken worden de onderdeelen van dat onderzoek door verschillende personen behandeld.

De bedoeling van het werk is dat er voor ieder die zich met de bestudeering van den bodem, het klimaat, de rivieren, de verbreiding van planten en dieren, de eigenaardigheden en de dialecten der bevolking van Duitschland zal willen bezighouden, een leiddraad aanwezig zal zijn, die hem in staat stelt na te gaan op welke zaken hij in het bijzonder heeft te letten, in hoeverre de bestaande litteratuur volledig en nauwkeu-

E. Debes, Politische Schulwandkarte des Deutschen Reiches und seiner Nachbarländer. 1:880,000. 6 Bl. Chromolith. Leipzig, Wagner & Debes, 1889. Pr. 6 M.; op linnen met rollen, 18 M. — Vlg. ook boven, p. 695.

¹⁾ Schaal 1:100,000. Berlin, Eisenschmidt, 1889. Per blad 1,50 M.

²⁾ Sch. 1:25,000. Berlin, Eisenschmidt, 1889. Per blad 1 M.

⁸⁾ Bijv. Karte des Königreichs Württemberg. Hrsg. von dem K. Stat. Landesamt, 1:400,000. Chromolith. Gr. Folio. Stuttgart, Kohlhammer, 1889. Pr. 2 M. — W. Liebenow, Karte der Rheinprovinz und der Provinz Westfalen, 1:240,000, 6 El. Berlin, Verlag des Berliner Lithogr. Instituts 1838. (Ref. van Vogel, PML. 1889, n°. 2111). Vlg. verder de uitgebreide opgaven in PML. 1889, n°. 2108—2150.

⁴⁾ Preussen und Thüringische Staaten. Geologische Karte in 1:25,000, herang. von der K. preuss. Landesanstalt. In afleveringen met tekst, en in bladen. Chromol. Berlin, Schropp, 1888 en '89. Sachsen. Geologische Spezialkarte, bearb. unter Leitung von H. Credner. 1:25,000. Chromolith. Leipzig, Engelmann, 1888 en '89, per blad 3 M., met tekst 3 M.

Elsass-Lothringen. Geologische Spezialkarte. Hrsg. von der Kommission für die geolog. Landesuntersuchung. 1:25,000. Berlin, Schropp, 1889. Per blad 2 M.

C. W. von Gümbel, Geognostische Karte des Königreichs Bayern. 1:100,000. Hreg. im Auftr. d. k. bayr. Staatsministeriums des Innern. Chromolith. Imp.-Fol. Gro. Kassel, Fischer, 1889. Met tekst à 24 M.

⁵⁾ A. Kirchhoff, Anleitung zur deutschen Landes- und Volksforschung. Im Auftrage der Zentralkommission für wissenschaftliche Landeskunde von Deutschland. 8°, 680 pp., met 1 kaart en 58 afbeeldingen. Stuttgart, I. Engelhorn, 1889. Pr. 16 M. (Uitvoerig refer. van Fr. Regel, PML. 1889, n°. 2098).

is en wat er nog te doen overblijft. Bedenkt men daarbij dat de verthillende hoofdstukken bewerkt zijn door geleerden als Penck, Drude, Sotz, Meitzen, Becker e.a. dan zal men inzien dat hier een werk tot stand gekomen waaruit ook anderen dan juist degenen die zelf weenschappelijke onderzoekingen in Duitschland willen instellen, veel kunen leeren; een arbeid dien men, in dat opzicht, kan vergelijken met de keende geschriften van Neymayer, Kaltbrunner en Richthofen.

Dat in een land als Duitschland, waar zooveel aan onderzoekingen op reographisch en aanverwant gebied gedaan wordt, vele nieuwe publicates zijn te vermelden, kan ons niet verwonderen. De geschriften welke onder den algemeenen titel: "Forschungen zur deutschen Landes- und Volkslande", verschenen zijn, vormen al eene geheele reeks, en zijn, even-🎎 de zooëvengenoemde "Anleitung", en de "Handbucher zur deutschen Landes- und Volkskunde", de vruchten der werkzaamheid van de "Zenvalkommission für wissenschaftliche Landeskunde von Deutschland", die sich indertijd in verbinding gesteld heeft met ons Genootschap, om ook ons land tot' deelneming aan haren arbeid op te wekken 1). Eene der nieuwste geschriften, welke tot bovenbedoelde categorie behooren, is de Belangrijke studie van Bezzenberger over de "Kurische Nehrung" en hare bewoners²); hij behandelt daarin de duinvorming en de beplanting der duinen met pijnboomen (pinus montana = p. pumilis), verder de verschillende plaatsen op de Nehrung en hare bevolking, welke bestaat uit Duitschers, Lithauers en Letten; laatstgenoemden worden dikwijls - ook in Oost-Pruisen - Koeren genoemd, hoewel ten onrechte. Zoowel over de taal en de levenswijze als over de middelen van bestaan der bewoners van de acht dorpen, welke op de smalle Nehrung gevonden worden, deelt de schrijver belangrijke bijzonderheden mede.

Verder hebben wij de bijdragen van Burgkhardt over het Ertsgebergte 3)

¹⁾ Zie de voorrede van het eerste deel der Algemeene aardrijkskundige bibliographie van Nederland, waarvan in 1889 het derde of laatste deel is verschenen. De bouw-soffen voor eene geographische beschrijving van Nederland zijn dus bijeenverzameld a geördend.

²⁾ A. Bezzenberger, Die kurische Nehrung und ihre Bewohner. Forsch. z. dentsch. Landes- und Volkskunde. Bd. III, Heft 4. 8°, 140 pp., 2 tabellen, 1 kaart, 2 afbeeldingen in den tekst. Stuttgart, Engelhorn, 1889. Pr. 7,50 M. (Ref. v. Hahn, PML. 1889, n°. 2161).

⁸⁾ Dr. J. Burgkhardt, Das Erzgebirge. Eine orometrisch-anthropo-geographische Madie. 8°, 159 pp., 1 kaart 1:300,000. Stuttgart, Engelhorn, 1888. Forsch. z. d. L. L. V.-kunde. Bd. III, Heft 3. Pr. 5,60 M. (Ref. v. Snpan, n°. 2165).

en Krones¹) over de vestiging der Duitsche bevolking in de Oost Alpen; eerstgenoemde heeft de dichtheid van bevolking voor de verschillende hoogten van het Ertsgebergte berekend, waarvan de tabel door Supan wordt overgenomen, die tevens eenige fouten daarin herstelt. Daar uit blijkt ook hoeveel grooter die dichtheid aan de noordwestelijke (Saksische) dan aan de zuidoostelijke (Boheemsche) zijde van het gebergte is een gevolg van de geringere hoogte en van de grootere ontwikkeling de dalen van eerstgenoemde. De gemiddelde hoogte boven den zeespiegel van het geheele gebergte bedraagt 564 m., die van de N. W. helling 545 m., van de Boheemsche 630 m.; de gemiddelde kam- top- en pashoogten zijn resp. 844 m., 878 m. en 812 m.; het gemiddelde verschil tusschen beide laatstgenoemde (door de Duitschers "Schartung" genoemd) bedraagt 66 m. De hoogste top is 1243 m., de laagste inzinking 595 m., de absolute "Schartung" derhalve 648 m.

Krones geeft een historisch overzicht van het verdringen der Slavische bevolking in de landschappen Oostelijk Tirol, Stiermarken, Karinthië en Krain door de Duitschers, gedurende de Middeleeuwen tot de 13de eeuw. Hoe de germaniseering dier landschappen heeft plaats gehad is in bijzonderheden niet na te gaan; een feit is het dat de Slaven vroeger woonden tot aan het brongebied van de Drau, de Mur en de Enns.

Ook het vierde deel der "Forschungen" bevat belangrijke bijdragen van Nordhoff over Westfalen, Blink over den Rijn in ons land, Ratzel over de sneeuwbedekking in de Duitsche gebergten, Birlinger over het gedeelte van het oude Alamannië, ten O. van den Rijn, Zacharias over de lagere dierenwereld van het Reuzengebergte²).

Vlg. ook M. v. Süssmilch gen. Hörnig, Das Erzgebirge in Vorzeit, Vergangenheit und Gegenwart. (In 11—12 Hest). 1 Hest Gr. 8°, 48 pp., Annaberg, Grass, 1889. Pr. 0,60 M. per Hest.

¹⁾ Dr. F. von Krones, Die deutsche Besiedelung der östlichen Alpenländer. 8°, 175 pp. Stuttgart, Engelhorn, 1889. F. z. d. L. u. V.-kunde. Bd. 111, Heft 5. Prijs 5,50 M. (Ref. v. Ed. Richter, n°. 2300).

²⁾ Haus, Hof, Mark und Gemeinde Nordwestfalens im historischen Ueberblicke von Prof. J. B. Nordhoff. Pr. 1,20 M.

Der Rhein in den Niederlanden von Dr. H. Blink, 70 pp., met keart. Pr. 4,20 M. (Zie TAG. 1889, M. p. 629).

Die Schneedecke, besonders in deutschen Gebirgen von Dr. F. Ratzel. Pr. 8 M. Rechtsrheinisches Alamannien; Grenze, Sprache, Eigenart von Dr. A. Birlinger. Pr. 4,80 M.

Zur Kenntnis der niederen Tierwelt des Riesengebirges nebst vergleichenden Ausblicks von Dr. O. Zacharias. Pr. 1,50 M.

Maar met het bovenstaande is de arbeid der "Zentralkommission" nog iet afgehandeld; behalve van de hierna te noemen handboeken (p. 715), van de bibliographie van ons land, over welke reeds boven werd gezoken (p. 711 n. 1), moet hier nl. ook melding gemaakt worden van e, mede op aansporing dier commissie, tot stand gekomene bibliograbie van het koninkrijk Saksen 1), eene feestgave van de "Verein fur Erdinde" te Dresden, ter eere van de 800-jarige heerschappij van het huis Vetin. Zij is, onder leiding van Prof. S. Ruge, verzameld door een fental medewerkers, terwijl Richter de titels heeft geördend en voor de ers gereed gemaakt, en er een uitvoerig register heeft bijgevoegd. Ook in Wurttemberg bestaat eene dergelijke bibliographie 2).

Onder de grootere werken verdient verder onze aandacht Schroller's eschrijving van Silezië 3), waarin het landschappelijk voorkomen van de erschillende gedeelten der provincie, de eigenaardigheden, de zeden en pebruiken der bevolking, en hare historische ontwikkeling geschilderd worden.

Van geheel anderen aard is het overzicht van de rivieren en de watermaatswerken in Beieren 4), dat wel is waar voor een groot deel van techischen aard is, maar waarin toch ook vele gegevens voorkomen die uit

¹⁾ P. E. Richter, Litteratur der Landes- und Volkskunde des Königreichs Sachen, 8°, 308 pp. Dresden, Huhle, 1889. Pr. 5 M. (Ref. van Fr. Regel, PML. '89, P. 3167). De hoofdstukken zijn: I. Bibliographie der landeskundlichen Litteratur und isschichte des Landes. II. Landesvermessung, Karten, Pläne und Ansichten. III. Landesverdliche Gesamtdarstellung und Reisewerke über das ganze Gebiet. IV. Landesnatur. I. Bewohner. VI. Zusammenfassende Landeskunde einzelner Bezirke und Ortschaftstunde.

²⁾ Uebersicht über die Litteratur der württembergischen und hohensollernschen Landesmide. Herausgeg. vom Württ. Verein für Handelsgeogr. 8°, 168 pp. Stuttgart, Kohlkmmer, 1888. Pr. 2 M.

⁵⁾ F. Schroller, Schlesien, eine Schilderung des Schlesierlandes. I mit 44 Stahlstehen und 51 Holschnitten von Theod. Blatterbauer, VIII u. 384 pp.; Il mit 7 Stahlstichen und 55 Holzschn., VIII und 410 pp.; III mit 10 Stahlst. u. 46 Holzschn.; 7 und 415 pp. Glogau, Carl Flemming. Per deel 15 M. (Ref. van Partsch, PML. 389, n°. 2162).

Over de plaatsnamen in Silezië schreef H. Adamy, Die schlesischen Ortsnamen, we Entstehung und Bedeutung. Zweite verm. u. verb. Aufl. 8°, 146 pp. Breslau, Priestsch, 1889. Pr. 2,50 M. (Ref. van Partsch, n°. 282).

⁴⁾ Der Wasserbau an den öffentlichen Flüssen im Königreich Bayern, herausgeg. von F. K. Obersten Baubehörde. Gr. 4°, 364 pp., 92 Taf. und 1 Karte 1:750,000. Inchen, Kellerer, 1888. Pr. 60 M. (Karte separat 3 M.). (Refer. van Supan, PML. 189, n°. 2194).

een geographisch oogpunt van gewicht zijn. De bij het werk gevoeg hypsometrisch-hydrographische kaart is ook afzonderlijk te verkrijgen.

Verder noem ik de beschrijving der meren van de Vogezen door He gesell en Rudolph 1); die van den Elzas door Grad 2), lid van de Rijksdag; die van het Kaiserstuhlgebergte door Neumann 3), wies doel was eenige van de voornaamste der tot nog toe bekend gewordes orometrische methodes kritisch te vergelijken, en de waarde van deze evenals van de door hemzelf toegepaste, te bepalen bij het onderzoek van een niet al te groot gebergte. De methode van Sonklar, in diens "Allgemeine Orographie", Wien 1873, ontwikkeld, voldoet niet aan alle eische en is in sommige opzichten verouderd, gelijk den schrijver ook reeds bizijne orometrische onderzoekingen van het Schwarzwald gebleken was 4).

Onder de nieuwere werken over de Jura en de Alpen mogen hie genoemd worden die van Boyer, Clerc, Löwl, Levasseur et Boissevain 5), van welke Boyer's en Löwl's beschrijvingen, uit een wetenschappelijk oogpunt, wel de meeste waarde hebben. Levasseur heef zich voorgesteld de Alpen bij het groote publiek in Frankrijk meer be kend te maken en geeft daarvan eene populaire beschrijving. Zeer onder houdend is het werkje van den bekenden Nederlandschen schrijver Van Nievelt⁶), van wien men kan leeren genoegelijk te reizen en veel te zien.

¹⁾ H. Hergesell und E. Rudolph, Unsre Vogesenseen. 8°, 32 pp., 1 Taf. Strassburg, Heitz, 1888. Festschr. d. Prot. Gymn. Strassburg. (Ref. v. Supan, n°. 2181)

Ch. Grad, L'Alsace, le pays et ses habitants. Gr. 4°, 1023 pp. 886 afbeeldingen en 17 kaarten. Paris, Hachette, 1889, Pr. 50 fr. (Ref. v. Weyhe, n°. 2169).

³⁾ Orometrische Studien im Anschluss an die Untersuchung des Kaiserstuhl-gebirges. Von Dr. L. Neumann. ZWG. VII, p. 820-82 en 861-78. 1 Tafel. (Refer. van Supan, n°. 2182).

⁴⁾ Dr. L. Neumann, Orometrie des Schwarzwaldes. Geogr. Abhandl. herausgeg. von Prof. Dr. A. Penck. Bd. I. H. 2. Wien 1886.

⁵⁾ G. Boyer, Remarques sur l'orographie des Monts-Jura. 8°, 71 pp., 1 kaari 1:90,000 en 8 profielen. Besançon, Dodivers, 1888. (Ref. van Maillard, n°. 319).

Ch. Clerc, Le Jura. 8°, IV en 215 pp., 1 geolog. kaart 1:500,000. Paris, Berger-Levrault, 1888. Pr. 5 fr. (Ref. van Böhm, n°. 820).

F. Löwl, Siedelungsarten in den Hochalpen. 8°, 51 pp. Stuttgart, Engelhorn, 1888.

— Forsch. z. d. L. u. V.-kunde. II. 6. Pr. 1,75 M. (Ref. van Supan, u°. 350).

E. Levasseur, Les Alpes et les grandes ascensions. Gr. 8°, 446 pp., 42 kaarten in den tekst, 2 bijlagen. Paris, Ch. Delagrave, 1889. Pr. 5 fr. (Ref. v. Diener, n°. 2221).

Ch. Boissevain, Over de Alpen. Reisindrukken uit Zwitserland en Italië. 8°, 402 pp., Amsterdam, Holkema, 1888, Pr. £2,50.

⁶⁾ C. van Nievelt, Bergstudiën. Een omgang in het land der Dolomieten. 8°a 195 pp. Leiden, Van Doesburgh, 1888. Pr. f 2,50.

e geologische werken over de Alpen en over verschillende gedeelten Middel-Europa zijn zeer talrijk; in dit beknopte overzicht, dat alles sikaar genomen, toch al zulk een omvang heeft gekregen, kan daarechter slechts eene zeer bescheidene plaats worden toegekend. Ik veste aandacht op de studiën van Schmidt¹, Diener²) en Leps³). Het werk van den laatstgenoemde is een der bovenbedoelde, door Centralkommission für wissensch. Landesk. von Deutschland¹, uitgen handboeken, evenals Richter's beschrijving van de gletschers der t-Alpen⁴).

wens eveneens van de overzichten der andere landen en werelddeelen ged kan worden — vestig ik de bijzondere aandacht van den belangende op de zeer uitgebreide bibliographie van publicaties betreffende geheele gebied der geographische litteratuur over het jaar 1889, voorbende in het tijdschrift der "Gesellschaft für Erdkunde" te Berlijn 5). Ia de voltooiing van het bovenstaande overzicht werd het bekend dat tschland en Engeland in Juni een tractaat hebben gesloten, volgens velk het eerstgenoemde rijk zijn beschermheerschap over Witoe en het taliland aan Engeland afstaat en er in toestemt dat Engeland het bermheerschap aanvaardt over het sultanaat Zanzibar, met uitzondering de kuststreek, welke aan de Duitsch-Oost-Afrikaansche maatschappij erpacht. Daarentegen staat Engeland aan Duitschland het eiland Helnd af, onder zekere voorwaarden, ten behoeve der bevolking van het nd, betreffende den dienstplicht en de invoerrechten.

ndien wij thans nog even den geographischen arbeid in Nederland aan valt onze aandacht op de reeds boven (p. 712) vermelde verhan-

C. Schmidt, Zur Geologis der Schweizer Alpen, 8°, 52 pp., 1 Taf. Basel, wabe, 1889. Pr. 1,60 M. (Ref. van Supan, n°. 2252).

C. Diener, Zum Gebirgsbau der Zentralmasse von Wallis. Sitz. Ber. Ak. Wiss. n 1889. Math. nat. Kl. Bd. XCVIII, p. 78—96. 2 Taf. Wien, Tempsky in Komm., D. Pr. 0,80 M. (Ref. v. Supan, n°. 2255).

Geologie von Deutschland und den angrenzenden Gebieten. Bd. I, 1 Lief. 8°, 254 met kaart 1:1,850,000. Stuttgart, Engelhorn, 1887. Pr. 11,50 M. (Ref. v. Supan, 181). 2. Lief.

E. Richter, Die Gletscher der Ostalpen. Gr. 8°, 806 pp., mit 7 Karten, 2 Anten und 24 Profilen im Text. Stuttgart, Engelhorn, 1888. Pr. 12 M. (Refer. van 1881, n°. 2288).

⁾ Uebersicht über die vom 1 November 1888 bis zum 81 December 1889 auf dem liete der Geographie erschienenen Bücher, Aufsätze und Karten. Zusammengestellt Dr. A. Wolfstieg. ZGEB. XXIV, 1889, p. 347—565.

deling van Dr. H. Blink, over den Rijn in ons land, en op het groot werk van dienzelfden schrijver over Nederland en zijne bewoners, wel is waar nog lang niet voltooid is, maar waarvan sedert mijn ve overzicht, eenige nieuwe afleveringen zijn verschenen.

Eene bespreking daarvan door E2 vindt men in deze aflevering ons tijdschrift (p. 537), waarnaar ik verwijs. E. Engelenburg gaf, het laatste nummer van het tijdschrift (p. 281 vlg.), eene bijdrage (de hydrographie en morphologie der zuidelijke zeegaten en riviermond in ons land, waarbij verscheidene kaarten, ook uit oudere werke zijn gevoegd. Deze geophysische en historische studie van iemand wie opleiding tot ingenieur en wiens waarnemingen, ook in een and werelddeel 1), hem alleszins bevoegd maken om zulk een moeielijk onde werp te behandelen, verdient zeer de aandacht. In het tijdschrift "I Ingenieur" 1889, n°. 9 plaatste Engelenburg ook een opstel over d eb- en vloedverschijnselen langs onze kusten, dat in de "Annalen de Hydographie" werd overgenomen. Hetzelfde onderwerp werd, bij geleges heid van het tweede Nederlandsch Natuur- en Geneeskundig Congres behandeld door Dr. H. Blink²), die tevens uiteenzette hoe, naar zijn meenig, tengevolge van het verschil in aanvoer van rivierwater in het N en het Z. van het haf, dat eenmaal bestond op de plaats waar tegen woordig de Zuid-Hollandsche en de Zeeuwsche eilanden liggen, alsmed van de beweging der zee langs de kusten, de eigenaardige langwerpige van West naar Oost gerichte gedaante dier eilanden ontstaan is. Ool Dr. J. Lorié, Dr. H. van Cappelle en C. Ubaghs leverden, of dat congres, bijdragen over de geographische en de geologische gesteldheid van ons land 3).

Verder zij hier herinnerd aan het opstel van kapitein P. A. van Buuren, over de plannen tot droogmaking der Zuiderzee, waarbij

¹⁾ Aanteekeningen gedurende mijn verblijf in de provincie Pará, door E. Engelesburg. TAG. III, 1887, A. p. 578 vlg.

²⁾ Dr. H. Blink, Eenige mededeelingen over de beweging des waters langs de Nederlandsche kusten in verband met de delta-vorming. Handelingen van het tweede Ned. nat. en geneesk. congres. Leiden, E. J. Brill, 1889. (Ref. van Rudolph, PML 1890, n°. 1176).

³⁾ Zie »Handelingen" enz., p. 222, 238 en 244, alsmede TAG. 1889, M. p. 461 vig.
Van Dr. van Cappelle sal, in de eerstvolgende aflevering van dit tijdschrift, een opstel over het Gaasterland worden opgenomen. Ik verwijs ook naar zijn artikel: Quelques considérations sur le Quaternaire ancien dans le Nord des Pays-Bas. Bull. Soc. Belge de Géol. Brussel 1888, II, p. 125—134. (Ref. van Supan, PML. 1889, n°. 244%).

ch overzicht der meest bekende van de vele bestaande plannen en bespreking van de voor- en nadeelen aan het ten uitvoer leggen het denkbeeld dier droogmaking verbonden.

het Zeitschr. f. Wiss. Geographie bespreekt Langeraad, op grond werken van Staring, Venema, Van Geytenbeek, Acker Stratingh, man e.a., en in verband met de tegenwoordige inzichten der geobetreffende de veranderlijkheid van den zeespiegel, de vraag of de wan Zeeland ten opzichte van den zeespiegel hooger is geworden hoe men zich die positieve niveau-verandering moet voorstellen. Hij in de oppervlakte der derrielaag — welke onder de klei ligt, en door geheele provincie nagenoeg in hetzelfde horizontale vlak, steeds onder ebstand - een abrasie-vlak, ontstaan nadat de stand van den zeespiegel merkelijk verhoogd was geworden door de doorbraak van den isthmus schen Engeland en Fankrijk. Daarop heeft de vorming der zeeklei ats gehad onder den invloed van de hoogere vloed- en ebstanden der langs onze kusten, terwijl ook omgekeerd de vorming van land ten rolge moest hebben dat zoowel de eb- als de vloedstanden langs de t hooger werden. Tegenwoordig duurt de positieve niveau-verandering voort, hetgeen o.a. wordt afgeleid uit de omstandigheid dat men, bij verbetering van den waterafvoer in het waterschap Sint Maartensdijk, bodem der groote afwateringsluis o.3 m. lager konde maken. Dit d niet kunnen gebeuren wanneer de ebbestanden thans nog steeds poger werden 2).

Eene andere bijdrage tot de kennis der bodemgesteldheid van ons land het proefschrift van Borgman over de hoogvenen³), waarin de chrijver de hoogvenen van Nederland, Hannover en, voor een deel, he van Oldenburg nagaat, wat betreft hunne samenstelling en ontwik-

¹⁾ Zie TAG. 1889; A. p. 194 vlg. Van denzelfden schrijver zal, in eene der volgende feweringen van dit tijdschrift, een opstel over de Waterstaatskaart verschijnen.

²⁾ Zur Frage der litoralen Niveauveränderungen. Von Abr. P. L. von Langeland. ZWG. VII, 1888, p. 265 vlg. met profielen en kaarten. Vlg. ook de bovenprocemde bijdrage van Lorié over het dalen van den bodem van Nederland; hij is ran meening dat er, nog in historische tijden, tot zelfs in den graventijd (p. 227 der Handelingen), daling van den bodem van ons land heeft plaats gehad, maar gelooft liet dat zij thans nog voortduurt.

⁸⁾ Bijdrage tot de kennis der geologische ontwikkeling van Nederlands hoogvenen. Proefschrift ter verkrijging van den graad van doctor in de aard- en delfstofkunde enz., door Andries Borgman, 175 pp., Winsum, Mekel, 1890.

kelingsgeschiedenis als geologische individuen, en vervolgens eene defin tracht te geven, die ze alle omvat. Volgens hem bestaan hoogvenen in "a. heide en de daaruit gevormde veenstoffen, of b. wollegras en "daaruit gevormde veenstoffen, of c. veenmos en de daaruit gevorm "veenstoffen, of d. een complex dier planten en veenstoffen, hetzij boom "het uit heide, wollegras of veenmos reeds gevormde hoogveen al de "niet tooien, hetzij veenstoffen, afkonistig van boomen, als wezenlij "of als accessorische bestanddeelen optreden of niet."

Daaruit blijkt dat Borgman het met Staring's bepaling der hooge veneminiet eens is. "Boomen hebben — zegt Borgman op p. 150 — dikwij "aanleiding gegeven tot hoogveenvorming in Nederland, Hannover e "Oldenburg. Tevens komen veel boomresten in deze venen voor; doe "nergens in deze landstreken komen boomen met van (hen) gevorme "veenstoffen voor als een veen.".... De "Waldmoore" der Duitschers zij ook niets anders dan venen, waarin zeer veel boomresten voorkomen.

Ik moet met de beknopte aanwijzing van het bovenstaande volstaan of Borgman's proefschrift in den handel verkrijgbaar is gesteld, is me onbekend. In het belang van de bevordering der kennis van de boden gesteldheid van ons land ware dat zeker wenschelijk, ook omdat andere er wellicht eerder toe gebracht zouden worden zijne waarnemingen na gaan en zijne gevolgtrekkingen te bespreken. Het vraagstuk der veer vorming is, door deze bijdrage, zeker eene schrede nader tot zijne oplossing gebracht.

Volledigheidshalve herinner ik verder aan de bespreking der openbare werken in Nederland door J. Kuyper³), het overzicht van de belangrijkste reizen der Nederlanders, in de 19de eeuw ondernomen en van de voornaamste werken in dat tijdperk op geographisch gebied verschenen, door Prof. Dr. C. M. Kan³), de opgave der bevolking van Nederlands gemeenten boven 10,000 inwoners, door J. F. Hoekstra⁴), de uitgave van het derde deel der Algemeene aardrijkskundige bibliographie van Nederland, door de Afdeeling "Nederland" van ons Genootschap⁵). Dit

¹⁾ Staring spreekt van hooge en lage venen, daarbij het oog hebbeude op de ligging van de oppervlakte der venen ten opzichte van de omringende wateren. Borgman gebruikt de benamingen hoogvenen en laagvenen, om daarmede aan te duiden dat de grondslag, waarop Staring's onderscheiding berust hem niet juist voorkomt.

²⁾ TAG. 1890, p. 832.

⁸⁾ TAG. 1889, M. p. 510 en 1890, p. 377.

⁴⁾ TAG. 1889, M. p. 487.

⁵⁾ TAG. 1889, M. p. 629 en 1890, p. 464.

is den lezers van het tijdschrift bekend, evenals de voorstellen van H. Blink aan het Bestuur, tot oprichting van een centraal-bureau geographische en geologische onderzoekingen in Nederland, en de ingen, in 1884 door verschillende geografen gedaan, om verbetering te ien in het hooger onderwijs in aardrijkskunde hier te lande. Bij bespreking van den geographischen arbeid in ons land, mag over te laatstgenoemde onderwerpen niet gezwegen worden, hoewel zij der zijn te beschouwen als voorbereidingen tot nog te verrichten eid.

Inder de verdere publicaties betreffende ons land, noem ik, behalve prachtige kaartwerken van ons land en zijne kusten en zeegaten, waart ook reeds in mijn vorig overzicht een enkel woord werd gezegd 3), beschrijvng der zeegaten van IJmuiden en Texel door C. J. de Jong, deel IV van de door het Ministerie van Marine uitgegeven "Beschrijg der Nederlandsche zeegaten" 4), het overzicht der scheepvaartkanalen Nederland 5), de nieuwe uitgave van Beekman's werk "De Strijd het bestaan," onder den titel "Nederland als Polderland" 6), het begrijke werk van Fijnje, in ons tijdschrift door Hagedoorn bewen 7), Mohr's schetsen uit Holland 8), de vertaling van Havard's lend werk "Les villes mortes du Zuiderzee" in het Duitsch 9), de vergen van de regeering, de provincien, de kamers van koophandel en verheid enz. betreffende den toestand van landbouw, handel, scheep-

¹⁾ TAG, 1890, p. 484 vlg.

³⁾ TAG. 1889, M. p. 466; 1890, p. 471.

Ng. ook: J. F. Niermeyer, Geographische Forschungen in den Niederlanden. Ausd 1889. n°. 22.

³⁾ Men zie ook TAG. 1890, p. 509, waar door Dr. I. Dornseiffen eene lijst brût gegeven van kaarten welke sedert April 1889 in de bibliotheek zijn opgenomen; mede de bespreking van enkele bladen der stafkaart, der chromo-topographische art en der waterstaatskaart, door F. E. L. Veeren, in deze aflevering.

^{4) &#}x27;s Hage, Gebr. van Kleef, 1889, VI + 70 pp. Pr. f 0,50.

b) Ibid. 1888, 155 pp., met kaart. Pr. f 2,50.

⁶⁾ A. A. Beekman, Nederland als Polderland. Goedk. uitg. Met 11 kaarten en laten. In afleveringen. Zutfen, Thieme, gr. 8°.

⁷⁾ TAG. 1889, M. p. 622.

⁸⁾ M. L. F. Mohr, Das moderne Holland. Skizzen und Umrisse aus dem Lande wasserbauten. Arnhem, Gouda Quint., Berlin, Rosenbaum & Hart, 1888. 211 pp. 1... 4 M.

⁹⁾ H. Havard, Eine malerische Reise nach den toten Städten der Zuiderzee. Aus Im Franz. 2 Aufl. XII + 351 pp. Jena, Costenoble, 1889. Pr. 3 M.

vaart en verdere middelen van bestaan der bevolking en de "gidsen wandelkaarten voor verschillende gedeelten des lands 1). Een voor vrei bezoekers van ons land (en waarschijnlijk ook wel voor vele Nederlas die hun eigen land willen leeren kennen) welkom toevoegsel tot de wone reisgidsen van Baedeker e.a. is vermoedelijk het werk van haffy en Rogers 2), waarin over vele plaatsen wordt gesproken w de toeristen gewoonlijk voorbijgaan.

Onder de nieuw verschenen atlassen en kaarten mogen genoemd den die van Beekman, Bruins 3), Dornseiffen 4), Kloeke de Jong en Tydeman 6) en Kusters 7); onder de leerboeken van Beekman, ten Have en Schriek. Mijn bestek gedoogt eter niet dat ik daarbij verder stilsta 8).

POOLSTREKEN EN OCEANEN.

Van de onderzoekingen van Hansen, Steenstrup en Rose vinge, in Groenland (zie p. 409 van mijn vorig overzicht) geeft Rink een vrij uitgebreid verslag⁹), waarbij hij ook nog eenige opm kingen voegt over Nansen's beroemden tocht door Groenland ¹⁰).

¹⁾ Zie TAG. 1890, p. 518.

²⁾ J. P. Mahaffy and J. E. Rogers, Sketches from a tour through Holk and Germany. London, Macmillan & Co., 1889. 8°, XV + 271 pp. Pr. 10 sh. 6 (Besproken in Proc. 1889, p. 116 en Sc. G. Mag. 1889, p. 218).

Zie TAG. 1889, p. 471, alsmede de bespreking van Bruins' atlas, door Sups PML. 1889, n°. 1775.

⁴⁾ I. Dornseiffen, Het koninkrijk der Nederlanden op eene schaal van 1:425,00 get. door E. de Geest. Met cartons. Amsterdam, Seyffardt. Pr. In zakformant 2 vouwen fl,—; op linnen in étui f2,25; op linnen met rollen f4,—.

⁵⁾ W. Kloeke, Kaart van Noord-Holland (tot Texel). Uitgeg. van wege de si Schagen van het Ned. Onderw. Gen. en opgedragen aan den schoolopziener in haarrondissement Helder, Mr. M. Buchner. Zwolle, J. J. Tijl, 8 bl. Pr. f7,50; opgel f11,—; opgepl. en gevernist f12,50.

⁶⁾ C. J. de Jong en G. F. Tydeman, Zeegat aan den hoek van Hollan 1:7500. XVIII, Noordsee. Den Haag, van Cleef, 1889. Pr. fl.—.

⁷⁾ G. L. H. Küsters, Eisenbahnkarte des Königreichs der Niederlande. Amsse dam 1889. (Ref. v. Vogel, PML. 1889, n°. 2435).

⁸⁾ Zie de aankondiging van Beekman's werk, door P. Kat Pzn., in -De Vast ture" van 12 Juni 1890.

⁹⁾ Die neuern dänischen Untersuchungen in Grönland, 1888. Von H. Rink. Ph. 1889, p. 113 vlg.

Van het gebied tusschen de zuidpunt van Groenland en 62° 80' N. Br. is eene kan gepubliceerd op de schaal van 1:600,000. Zie PM. 1889, p. 127.

¹⁰⁾ Zie mijn vorig verslag, p. 409, en: Journey across the inland ice of Greenland

tocht heeft ook de hoop verlevendigd dat men er nog eens in zal de Noordpool te bereiken; Nansen wil door de Behringstraat en in noordwestelijke richting stevenen, met de verwachting dat de hem onderstelde strooming in noordelijke richting, ten opzichte van ie, zijn schip in de zee tusschen Spitsbergen en Groenland zal brende Deensche marine-officier C. Ryde heeft voorgesteld de Oostvan Groenland te onderzoeken tusschen 66°, het verste punt dat kapitein Holm bereikt werd, en 73°, waar de tweede Duitsche experin 1869—'70 opnemingen heeft gedaan 2).

en grootsch plan is dat tot uitrusting eener antarctische expeditie, releicling van den beroemden poolreiziger Nordenskjöld³); de editie, welke gedeeltelijk bekostigd zal worden door de Australische onien en ten deele door Dickson, zal in den herfst van 1891 de aanvaarden. Het is zeer te hopen dat zij tot stand moge komen.

Dver de reis van Kukenthal en Walter, in 1889 naar Oost-Spitsgen, worden door den eerstgenoemde uitgebreide mededeelingen gein 4), terwijl de bekende onderzoeker van IJsland, Th. Thoroddsen, n overzicht geest van zijne reis in het zuidelijk gedeelte van dat eiland 1889 5).

m east to west. By Dr. Fridtjof Nansen. Proc. 1889, p. 469 vlg., met kaart;

De vertaling van Nansen's officieël verslag aan den staatsraad Gamél, in het »Geograk Tidskrift" 1889, p. 64, vindt men in ZGEB. 1889, p. 260—74, met kaart van beenlaand volgens het standpunt van het onderzoek in 1889.

¹⁾ Der Weg zum Nordpol. Von R. Asmuss. PM. 1890, p. 107. Hier worden de ponden, op welke Nansen's plan berust, in bijzonderheden besproken.

⁹⁾ PM. 1890, p. 88. Kapitein R. Knudsen is in Juli 1889 door het drijfijs tot Oostkust van Groenland, bij König Wilhelmsland, doorgedrongen.

^{1. 8)} Ibid. p. 88; Ymer 1889, IX, p. 122—128 en TAG. 1890, p. 462. Ik maak van fane gelegenheid gebruik om de aandacht te vestigen op de uitgave van Nord en skjöld's Facsimile-Atlas. Stockholm, Bonnier, 1889, waarmede hij zich ten doel heeft gesteld, de belangrijkste documenten der kartographie uit de 14de en 15de eeuw volkomen nauwkeurig weer te geven. Het is een kostbaar werk, dat voor de kennis van de stetwikkeling der kartographie en van de geschiedenis der ontdekkingsreizen hooge waarde beeft. (PM. 1890, p. 110).

⁴⁾ Bericht über die von der Geographischen Gesellschaft in Bremen im Jahre 1889 veranstaltete Reise nach Ostspitsbergen (Dr. Kükenthal und Dr. Walter). Von Prof. Dr. Kük en thal in Jana. Mit Karte. T. 5. PM. 1890, p. 61 vlg.

⁵⁾ Reise im südlichen Island, 1889. Von Th. Thoroddsen. PM. 1889, p. 275. Zie ook de bespreking der wetenschappelijke resultaten sijner reizen in 1884, door Keilhack, in PM. 1890, no. 1118 en 1114.

Over de reizen van Wiggings naar de Kara-Zee en de planning verbinding van Europa en Noordelijk Siberië leze men het artiken Sewell'). In 1889 is Wiggins, met zijne stoomboot "Labrador" at den mond der Jenissei gevaren en van daar naar Noorwegen teen keerd, echter zonder zijne goederen verhandeld te hebben, daar de at stoomboot, op welke hij wachtte, niet kwam²).

Verdere publicaties over de poolstreken zijn: het verslag van Greover de waarnemingen in de Lady Franklin baai³), Rink's beschrij van de Eskimo-stammen⁴), de werken over IJsland van Labon Groote, Baumgartner en Meignan⁵), welke laatste echtere een wetenschappelijk geographisch oogpunt, over het geheel weinibeduiden hebben.

Over de waarnemingen der Denen in Godthaab is het tweede deelt het verslag verschenen ⁶), terwijl Paulsen, over wien ik ook in a overzicht heb gesproken, een artikel heeft gepubliceerd over den landruk en de temperatuur in het binnenland van Groenland ⁷).

¹⁾ Lapland and Siberia by way of the arctic sea. By Philip Sewell, Sc. G. 1889, p. 181.

²⁾ PM, '90, p. 88.

⁸⁾ A. W. Greely, Report on the Proceedings of the U.S. Expedition to Li Franklin Bay, Grinnell Land. 2 vol. 4°, 545 + 788 pp. Washington 1888. (Uitv. rd van Ratzel en Supan, PML. 1889, n°. 1716).

⁴⁾ H. Rink, The Eskimo tribes, their distribution and characteristics, especial in regard to language. Meddelelser om Grönland. 1887, XI, 8°, 63 pp., met keart (Pl 1888, p. 74 en uittreksel in Sc. G. Mag. 1889, p. 191).

Vig. ook A. F. Chamberlain, The race and language of the Eskinos. Proceedings. April 1889 on F. Boas, The Central Eskimo. (Uitv. bespreking dot Rink in PML, 1890, no. 1182).

⁵⁾ H. Labonne, L'Islande et l'archipel des Faeroeer. 8°, 899 pp. met 57 afbei dingen en 2 kaarten. Paris, Hachette, 1888. Pr. 4 fr. (Ref. v. Keilhack, PML 1881 n°. 1688).

E. de Groote, Island. Paris, Nillson, 1889, Pr. 6 fr.

A. Baumgartner, Nordische Fahrten. Island und die Faröer. Mit Abb. weiner Karte. 8°, 463 pp. Freiburg i. Breisg., Herder, 1889. Pr. 8 M. (Ref. van Kelkhack, PML. 1890, nº. 1109).

V. Meignan, Pauvre Islande! 8°, 281 pp. Paris, E. Kolb, 1889. Pr 3,50 kg (Ref. als boven, n°. 1110).

Observations internationales polaires. Expédition danoise. Dl. II, 2de afd. Kopenhagen, Gad., 1889. Pr. 20 kr. (Uittreksel in PML. 1890, n°. 1126).

⁷⁾ A. Paulsen, Om Lufttryk og Temperaturforholdene i det indre Grönland. 9005. Tidskrift 1889, X, p. 72-76. (Bespreking door Rink. PML. 1890, nº. 1128).

thet gebied der oceanographie zijn van het grootste belang de onlangen der laatste jaren in den Indischen Oceaan, door de schepen prise", comm. A. S. Barker, Juni—Sept. 1883, "Essex", comm. T. ivell, Nov.—Dec. 1886, "Flying Fish", Dec. 1886—Maart 1887, en ia", comm. Pelham Aldrich, 1887.

vergelijking der kaart van Prof. Krummel in ZWG. II 1881 met p in PM., doet ons zien welke groote vorderingen, door die onderngen, in de kennis van den Indischen Oceaan gemaakt zijn. Ten Z. den Chagos-archipel en het Keeling-eiland is op eerstgenoemde kaart gebied, zich uitstrekkende tot dicht bij de eilanden Amsterdam en Paul, waar geen peilingen konden worden ingevuld; thans zijn ze verricht door de "Egeria", van Java over het Keeling-eiland naar riguez en Mauritius, vervolgens in Z. W. richting tot ca. 37° Z. B. en ma oostelijk over Amsterdam naar de zuidkust van Nieuw-Holland en Bass-straat. Ook de waarnemingen betreffende bodemgesteldheid en peraturen op groote diepten zijn van veel gewicht. De grootste diepte or de "Egeria" in den Zuidelijken Grooten Oceaan gemeten bedraagt m, met eene bodemtemperatuur van +0,9° en bevindt zich op 24° Z. en 175° W.; 12 zeemijlen zuidelijker is eene diepte van 7855 m. "Challenger" had in 1874, op 25° 5' Z. en 172° 56' W., eene diepte 5303 m en eene bodemtemperatuur van + 0,5° gevonden 2). De grootdiepten der wereldzee (ongerekend de poolzeeën) zijn nu, voorzoover **ÿ** weten:

 Noordelijke Groote Oceaan
 44° 55′ N. 152° 26′ O. 8513 m.

 Zuidelijke "
 24° 37′ Z. 175° — W. 8101 "

 Noordelijke Atlantische Oceaan
 19° 39′ N. 66° 26′ W. 8341 "

 Zuidelijke "
 "
 0° 11′ Z. 18° 15′ W. 7370 "

 Indische Oceaan
 9° 18′ Z. 105° 28′ O. 5852 "

De laatste opgave is het resultaat der peilingen van de "Egeria", waarvan eene tabel wordt gegeven op p. 168 van PM. 1889.

Zij die Krummel's Oceanographie II bestudeerd hebben, zullen zich herinneren dat de aanwezigheid van het vergelijkenderwijs koude water langs de kusten, bij aflandigen wind, wordt toegeschreven aan het opkomen van water uit grootere diepte, hetwelk in vergelijking met dat aan de oppervlakte, eene lagere temperatuur heeft. De waarnemingen der laat-

¹⁾ Vlg. het overzicht door Supan gegeven in PM. 1889, p. 168, met kaart (T. 10) van den Indischen Oceaan.

²⁾ Vlg. PM. 1889, p. 77.

ste jaren hebben dit meer en meer bevestigd, zoowel wat betreft de Oceaan, met name den Indischen Oceaan, gelijk uit den atlas van he Nederlandsch meteorologisch Instituut 1) en uit de kaarten van Strache blijkt, als zelfs bij de zoet- en zoutwater "lochs" in westelijk Schotlane waar Murray onderzoekingen daaromtrent gedaan heeft 2).

De wind doet eene strooming aan de oppervlakte ontstaan van de loe naar de lijzijde, en tengevolge daarvan ontstaat eene onderstrooming i tegengestelde richting, waardoor het dieper liggende water aan den loe kant opkomt.

In de fjorden, waar des winters koud water boven warm water ligs verkrijgt men, bij aflandigen wind, het laatste aan de kust. Het proces hetzelfde, het resultaat, in dit bijzondere geval, omgekeerd 3).

In verband met de opmerkingen van Engelenburg in het boven doc mij genoemde opstel over de zeegaten en riviermonden in Nederland (zi o. a. p. 283 van dat opstel), vestig ik de aandacht op Krummel's be langrijk artikel over erosie door getijdestroomingen), die voor bepaald kustvormen, gelijk de schrijver zegt "geradezu als massgebendes Agen auftreten."

Wegens plaatsgebrek moet ik mij bij dat opstel, evenals bij de volgende opgaven, bepalen tot eene eenvoudige aanwijzing.

Over de bekende Plankton-expeditie in den Atlantischen Oceaan, on der leiding van Prof. Hensen, vindt men mededeelingen in PM. 5), zoc wel betreffende het voorkomen der plankton, als aangaande de gedan peilingen enz.

Onder de werken over den Oceaan noem ik ten slotte Marshall'

¹⁾ Stroomingen en temperatuur aan de oppervlakte in de golf van Aden en den Indeschen Oceaan bij kaap Guardafui. Uitgegeven door het K. Nederl. Meteorole gisch Instituut. 40 pp. en 12 kaarten. Utrecht, J. van Druten, 1888. (Ref. van Supan, PML. 1889, n°. 1752).

Barometerstanden en winden in de golf van Aden enz. 4°, 7 pp. en 13 kaarten. Utreck 1889. (Ref. 1890, n°. 1198).

²⁾ J. Murray, On the effects of wind on the distribution of temperature in the sea- and fresh-water locks of the West of Scotland. Sc. G. Mag. 1888, p. 345-65.

³⁾ Vlg. de mededeeling van Supan, Das kalte Wasser an den Lewküsten. PM 1889, p. 170.

⁴⁾ Ueber Erosion durch Gezeitenströme. Von Prof. Dr. O. Krümmel. Mit 9 Karten auf Tafel 10. PM. 1889, p. 129 vlg.

PM. p. 128, 256 en 296. Zie ook: O. Krümmel, Die Plankton-Expedițion in Sommer 1889. Verh. Ges. Krdk. Berl. 1889, XVI, p. 502—526.

chrijving van het organische leven op grootere diepten 1), Phelp's actical Marine Surveying" 2), Kreidel's onderzoekingen over den p der vloedgolven 3), het verslag van Simpson over het ijs en zijne vegingen in de Bering-zee en het poolbekken 4). Ik moet verder verszen naar het Litteraturbericht PM. 1889 n°. 1720—1753 en 1890 n°. 10—1199, waar veelal tabellen worden gegeven van de gedane peilina, o. a. van die der "Albatros", onder Tanner, in 1889; der "Thetis" de Bering-zee, der "Roddam" en der "Dolphin", in den N. Atlantihen Oceaan 1888 en 1889, enz.

Afgesloten half Juli.

¹⁾ W. Marshall, Die Tiefsee und ihr Leben. 8°, 343 pp. 4 Taf. und 114 Textbildungen. Leipzig, Hirt & S., 1888. (Ref. v. Supan, PML, 1889, n°. 1720).

³⁾ New-York, Wiley, 1889. Pr. 2,50 dl. (Aangek. in Science, 1890, XV, p. 78).

³⁾ W. Kreidel, Untersuchungen über den Verlauf der Flutwellen in den Oceanen.

P, VIII, 45 pp. Frankfurt a. M., Reitz & Köhler, 1889. Pr. 2 M. (Ref. v. Günther,

ML. 1890, n°. 1150).

⁴⁾ E. Simpson, Report on the Ice and Ice movements in Bering Sea and the betic Basin. 8°, 25 pp. met 1 plant. Washington, Hydrogr. Off., 1890. (Uitv. refer., Krümmel, PML. 1890, n°. 1196).

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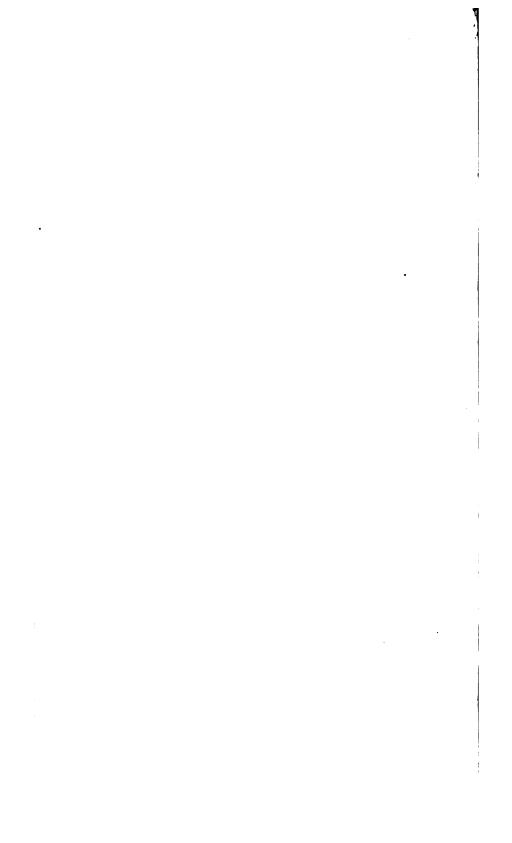
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VERSLAG

VAN DE

ZESTIGSTE ALGEMEENE VERGADERING

VAN HET

KONINKLIJK NEDERLANDSCH AARDRIJKSKUNDIG GENOOTSCHAP.

GEHOUDEN OP ZATERDAG DEN 218TEN JUNI 1890, IN HET GEBOUW VOOR KUNSTEN EN WETENSCHAPPEN TE 'S GRAVENHAGE.

De goed bezochte vergadering was gewijd aan de voordrachten der heeren S. W. Tromp, over Borneo, en P. A. van Buuren, over de Waterstaatskaart van Nederland, welke met de meeste belangstelling door de aanwezigen werden aangehoord.

De Voorzitter des Genootschaps, de heer W. F. Versteeg, maakte van deze gelegenheid gebruik om aan de leden mede te deelen, dat door de Regeering, op de daartoe door het Bestuur gedane aanvrage, voor het jaar 1890 alsnog eene som van vijf duizend gulden ter beschikking des Genootschaps was gesteld, ten behoeve van de, door Dr. H. F. C. ten Kate in te stellen, wetenschappelijke anthropologische en ethnologische onderzoekingen op het eiland Flores. De heer Ten Kate zal in het najaar de reis naar Indië aanvaarden.

De beide bovenbedoelde voordrachten, voor welke de Voorzitter aan de sprekers den hartelijken dank der vergadering betuigde, volgen hier in haar geheel.

MEDEDEELINGEN UIT BORNEO

DOOR

S. W. TROMP.

M. H. Het zij mij vergund U eenige oogenblikken bezig te houden met mededeelingen omtrent het grootste onzer Oost-Indische eilanden, Borneo, hetwelk, zooals bekend is, gedeeltelijk aan Engeland, grootendeels echter aan ons toebehoort.

Over dit eiland is reeds veel geschreven op elk gebied. Veel weet men dan ook reeds daarvan; doch nog meer is geheel onbekend, vooral van het centrum weet men totaal niets.

Op een en ander, dat ik te weten kwam, wensch ik hierachter de aandacht te vestigen en daaraan mijne beschouwingen over verschillende onderwerpen, die niet van belang ontbloot zijn, toe te voegen.

Op den voorgrond heeft bij mij gestaan iets nieuws te leveren, althans zoo min mogelijk te zeggen, hetgeen reeds gepubliceerd werd. Al moge aan de meesten Uwer alles wat over Borneo geschreven werd, niet bekend zijn, het lag, dunkt mij, in den aard der zaak, dat, wanneer ik in het Aardrijkskundig Genootschap als spreker optrad, ik ook iets moest ten beste geven, hetgeen niet elders te vinden was.

Wanneer men het onbekende centrum van Borneo van de Oostzijde wenscht te naderen dan is de aangewezen weg daartoe die langs de groote Mahakam-rivier, waarvan het geheele stroomgebied gerekend wordt tot het rijk van Koetei, welks machtige sultan een leenman is van het Nederlandsch-Indisch Gouvernement.

De Mahakam is per stoomer op te varen tot aan de monding van de Pahoe-rivier, die ontspringt op de grenzen van het oude Banjermasinsche rijk, tegenover de bronnen der Teweh-rivier, een zijtak van de Baritoe, aan de zuidkust van Borneo uitmondende. Moewara-Pahoe ligt circa 150 Engelsche mijlen boven Samarinda, de standplaats van den Assistent-Resident van Koetei, ongeveer 40 Eng. mijlen van zee verwijderd.

Boven Moewara-Pahoe zijn alleen roeivaartuigen te gebruiken.

De Mahakam werd in het jaar 1847 door Dr. Schwaner en Von Dewall tot aan de zijrivier Merak opgevaren. De bijzonderheden van dezen tocht zijn ons bekend geworden uit de "Dagelijksche aanteekeningen" van den laatsten, medegedeeld door den toenmaligen Gouverneur van Borneo, in het Indisch Archief (eerste jaargang, dl. I).

Vóór Von Dewall en Schwaner was alleen Muller in 1825 de Mahakam zoo ver en zelfs nog veel verder opgevaren. Van zijne bevindingen weten wij echter niets, omdat hij, zooals bekend is, onder weg vermoord is geworden.

Na hen is niemand meer zoo diep landwaarts in geweest, totdat ik in 1885 daartoe in de gelegenheid was.

De aanleiding daartoe was het volgende: In de verste bovenstreken van de Baritoe houdt zich nog steeds een pretendent-sultan Goesti Mat Seman op, omringd van een gering aantal Moehamedaansche volgelingen, met wie hij onder de Siang-Dajaks eene schuilplaats gevonden heeft.

Hoewel ons niet voortdurend bedreigende, verwekt genoemde Goesti toch van tijd tot tijd onrust in ons gebied en berokkent hij ons somtijds meer of min ernstige moeielijkheden. Er waren destijds in Koetei berichten ontvangen, dat Goesti Mat Seman moeite deed om in de Bovenstreken onder de Bahau-Dajaks van Oeloe 1)-Mahakam aanhang te verwerven, hetgeen hij te voren ook meermalen scheen gedaan te hebben en het kwam den sultan en mij, toen ter tijde assistent-resident ter Oostkust van Borneo, wenschelijk voor, die pogingen zooveel mogelijk tegen te gaan.

Dit kon niet beter geschieden dan door met de hoofden en bevolking der Oeloe-Mahakam te spreken en hun voor te houden wat de gevolgen zouden zijn, indien zij met een vijand van het Gouvernement en van den sultan heulden. Vooral achtten wij het van belang, dat een betrekkelijk aanzienlijke macht de Oeloe-Mahakam bezocht, opdat men dáár van de mogelijkheid eener tuchtiging overtuigd zoude worden. Te voren toch had nimmer eenig belangrijk machtsvertoon van des sultans zijde in dit moeielijk te bereiken gedeelte plaats gehad en scheen men dit ook in de Oeloe-Mahakam niet mogelijk te achten.

Er deed zich echter een groot bezwaar voor, namelijk dat noch de sultan zelf, noch iemand zijner naaste familiebetrekkingen de Mahakamrivier hooger dan de Goenoeng-Sindawar, een bergje aan den oever der rivier, ruim één dagreis boven Moewara-Pahoe en beneden de landstreek

¹⁾ Oeloe is bovenloop eener rivier.

Oeloe-Mahakam gelegen, mocht opvaren op grond van eene overeenkomst, die zich wel in het sagentijdperk verloor, maar waaraan toch niet minder de hand werd gehouden.

Om dit bezwaar te boven te komen, stelde ik den vorst voor om namens hem den tocht te ondernemen, hetgeen hij gereedelijk goedkeurde.

Zoo toog ik den 11den Augustus 1885 op reis, vergezeld van een tweehonderd-tal Boegineezen en Koeteineezen, onder leiding van Pangeran Bandahara en Pangeran Sokmawira, beiden zeer vertrouwde mantri's.

Van dezen tocht diende ik later een verslag in dat, besnoeid, in het Tijdschrift van het Bataviaasch Genootschap, Deel 32 (1889), bl. 273, verscheen.

Van het gepubliceerde zal ik hier zoo min mogelijk meedeelen, doch een en ander moet ik daaraan wel ontleenen, omdat niet alles gemist kan worden in verband met het later volgende. Van het niet gepubliceerde gedeelte van mijn rapport zie ik geen bezwaar wat meer aan te halen.

De reeds meermalen genoemde Oeloe-Mahakam is eene landstreek aan de Mahakam, zich uitstrekkende van Goenoeng-Batoe, een kleine dagreis boven de straks genoemde Goenoeng-Sindawar, tot aan eene reeks watervallen, boven de kampong Longglat-lirong-tika beginnende, en bekend onder den naam van Kapala-Kiham.

Gedurende de eerste dagreis in deze Oeloe-Mahakam tot aan de kampong Kliwaij wisselen hoogten en laagten elkaar aan den oever af; maar verder naar boven zijn de oevers bijna voortdurend heuvelachtig.

De grond, dien men te zien krijgt, lijkt niet bijzouder vruchtbaar; de kleur is veelal grijs tot roodachtig toe; dikke humuslagen komen nergens bloot. De plantengroei is ook niet treffend weelderig, gelijk men in zoo veel andere streken onzer koloniën ontmoet. De conclusie hieruit te trekken wordt niet weersproken door de resultaten der rijstcultuur, die over het algemeen ongunstig zijn.

Onder den ondiepen bovengrond is overal een steenachtige ondergrond aanwezig. Op vele plaatsen komt die steenige bodem aan den dag, vooral tusschen Hoenau-Hoelau en Liroeng-Kedawang en beneden Longglatlirong-tika, waar zich de oevers soms als reusachtige muren, dan wel meer dan honderd voet hoogte, loodrecht uit het water verheffen.

Of de Oeloe-Mahakam rijk is aan metalen, is mij niet bekend. In elke kampong heb ik navraag gedaan naar waardehoudende ertsen maar niets mogen ontdekken; alleen is het zeker, dat op vele plaatsen goed ijzer wordt aangetroffen.

Boschproducten zijn echter in deze streek nog in goede hoeveelheid voorhanden, al zijn zij lang niet meer zoo gemakkelijk als vroeger in te zamelen.

Ik wil mij hier eene uitweiding veroorloven over den bodem van Koetei, een punt van groot actueel belang, nu de landbouwnijverheid niet alleen in het Noorden maar ook reeds in het Westen van Borneo een nieuw veld ter exploitatie schijnt gevonden te hebben.

Natuurlijk is mijn oordeel in dezen niet dan zeer gebrekkig, 1° omdat ik geen deskundige ben, 2° omdat ik van het land weinig meer gezien heb dan hetgeen men te aanschouwen krijgt bij het opvaren der Mahakamrivier. Toch heeft het, naar ik mij vlei, eenige waarde, omdat er niemand is, die *meer* dan ik van het land gezien en gehoord heeft en dewijl dat oordeel geheel onaf hankelijk is van eenig persoonlijk belang, hetwelk in dezen tijd van prospectussen en concessiehandel van gewicht is.

Daarbij komt, dat ik mij tot het uitspreken van mijn oordeel in dezen eenigermate genoopt gevoel, omdat meh, ik ben gelukkig vergeten wie, zich vroeger op mij beroepen heeft bij het aanprijzen van Koetei voor de cultuur van tabak, met vermelding zelfs, dat ik met dit gewas goed geslaagde proeven had genomen, hetgeen geheel onwaar was. Ik wensch mij zooveel mogelijk te houden aan hetgeen ik omtrent dit onderwerp in mijn rapport opteekende, waar ik het ter sprake bracht bij het noemen van de Seboeloe-rivier, een zijtak der Mahakam, waarvan ik de monding 8 uur stoomens boven Samarinda passeerde.

Aan de Seboeloe, zoo schreef ik, wordt sedert eenige jaren tabak geplant door een Bandjerees Hadji Brahim, die er geld mee verdiend heeft. Ik had dit gehoord en toen ik de vorige keer hier passeerde (ik voer twee maal de Mahakam-rivier op, eens in Maart en eens in Augustus 1885), ben ik daarom aan land gegaan, ten einde de tabak te zien en zoo mogelijk monsters te verzamelen ter verspreiding onder belangstellenden.

De tabak was toen echter reeds geheel geoogst en tot verkoop gereed; het product was evenwel zóó slecht bewerkt (na het plukken der blaren waren deze onmiddellijk gekerfd en daarna in de zon gedroogd) dat het ongeschikt was voor monster, om daaruit eenige conclusie ten opzichte van de cultuur te trekken.

Ik had mij voorgenomen nu, dat, volgens de door Hadji Brahim in Maart gemaakte berekening, de nieuwe tabak bijna rijp zoude zijn, het te veld staande gewas te bezichtigen en zoo mogelijk mooie blaren te verzamelen en te droogen; ik moest echter vernemen, dat de man ziek was geworden en niemand voor de overplanting van het uitgezaaide zaad had zorg gedragen.

Dit is eene groote teleurstelling, want Seboeloe is een van de weinige streken, ja, voor zoo ver mij bekend is, zelfs de eenige van deze geheele afdeeling, waar de politieke toestand geen bezwaar is voor landelijke ondernemingen en waar tabak geplant wordt. Of de grond te Seboeloe goed voor tabak is, is eene vraag, die ik niet kan beoordeelen; de tabak van dáár afkomstig, door mij geproefd, was slecht, maar dit bewijst niets ten nadeele van den grond. Hadji Brahim verklaart zelf nooit te hebben gezien of gehoord hoe tabak verbouwd en bereid wordt.

Maar het is reeds veel, dat daar eene plaats is, waar tabak geplant wordt; waar dus deskundigen althans iets hebben om eene kansrekening op te baseeren of plannen op te bouwen. Men praat zoo gaarne over dien vruchtbaren bodem van Borneo's Oostkust, zoo uitstekend geschikt voor tabakscultuur, maar het is nog niet eens zeker of daar tabak wil groeien. Dit was ten minste zoo; thans maakt Seboeloe eene uitzondering, want het is in allen gevalle zeker dat dáár wel tabak wil groeien. Hadji Brahim heeft er reeds, zooals ik zeide, wat geld mee verdiend.

Ik schreef dit in het laatst van 1885; ik liet daarop volgen: "De bodem van Koetei wordt over het algemeen hoog geroemd." Naar hetgeen ik gezien en gehoord heb, geloof ik dat die taxatie onjuist is en dat de grond in Koetei meerendeels schraal is. Deze opinie baseer ik op de drie volgende omstandigheden; 1° dat ladang's (drooge rijstvelden) slechts één jaar bruikbaar, dat is rentegevend, zijn; ik ken vruchtbare gronden op Sumatra, waar een ladang drie jaar aanéén wordt beplant;

- 2° dat de bosschen, die door de geweldige droogte van 1878 zijn verbrand, zich thans nog niet hersteld hebben (op goede gronden is een afgebrand terrein na 7 jaar weer zwaar bosch geworden);
- 3° dat hier algemeen zoo veel goed hout gevonden wordt; de ervaring toch heeft mij geleerd ('t kan zijn ten onrechte), dat op goede gronden slecht hout groeit en goed hout, dat langzaam opschiet, alleen afkomstig is van schrale gronden.

Al is mijn oordeel juist, dan kunnen er daarom toch nog wel goede terreinen zijn. Zoo wordt b. v. het land, door de Toendjoeng-Dajaks bewoond, om zijne vruchtbaarheid geroemd; zoo zijn ook de lage landen beneden Samarinda, die met hoog water overstroomd worden, zeer in trek voor de rijstteelt; zoo kan het ook wezen, dat Seboeloe eene vruchtbare enclave is, evenals de goede Delische gronden tusschen slechte terreinen geënclaveerd, althans daardoor gedeeltelijk begrensd. Maar in allen gevalle zullen de goede gronden in Koetei gezocht moeten worden en liggen zij er niet voor de hand.

Hierna sprak ik in mijn rapport van eene vernauwing in de Mahakam-rivier, Naga-Beoeloer geheeten, 2½ uur stoomens boven de monding der Seboeloe. Ik zeide daarvan: "Boven Naga-Beoeloer wordt het land plotseling geheel vlak; de heuvels, die men van af Pelarang (een half uur stoomens beneden Samarinda), bij afwisseling meer of minder nabij gehad heeft, komen in het verdere gedeelte der reis tot aan Melak nabij de Goenoeng-Sindawar niet meer voor. Het schijnt dat het geheele binnenland van Koetei eene groote binnenzee geweest is, zich noordelijk uitstrekkende tot nabij de Berouwsche grenzen, zuidelijk tot Goenoeng-Beratoes, en tot uitgang hebbende de nauwe passage bij Naga-Beoeloer, waar de rivier, naar men beweert, nu nog op sommige plaatsen eene diepte heeft van meer dan honderd vadem.

Die gewezen binnenzee is thans nog niet geheel aangevuld; links en rechts van de Mahakam vindt men nog groote meren en moerassen. Al dit terrein, zoowel de bodem van die plassen als de grond daaromheen, die toch ook nog bij elken hoogen waterstand, dus verreweg het grootste deel van het jaar, onder water staat, hoogt zich nog steeds op door het afgevoerde slib der rivieren en door rottende plantendeelen. Dat groote middenstuk van Koetei is, om zoo te zeggen, nog niet afgewerkt en daardoor voor vele cultures ongeschikt.

Laat mij hier nog bijvoegen, dat, wanneer men de Koetei-rivier opvaart, men eerst een vlak land te zien krijgt, dat, zooals ik straks opmerkte, in trek is voor de rijstcultuur en misschien ook voor de teelt van suikerriet geschikt zou zijn; daarna stoomt men door heuvelachtig terrein, zoo niet geheel dan toch gedeeltelijk bestaande uit steenkoollagen, bedekt met eene laag geel roode aarde van geringe vruchtbaarheid; hierop volgt de bedoelde gewezen binnenzee. In deze ligt o. a. Moewara-Pahoe, waar de stoomer "Ternate" den 13^{den} Augustus 1885 voor den vloed om haar anker zwaaide; de waterstand was toen zeer laag, maar als men bedenkt, dat Ma-Pahoe toch circa 190 Engelsche mijlen, langs de rivier gemeten, van zee af ligt dan is dit feit wel een sterk bewijs voor de geringe helling van den bodem diep landwaarts in.

Ten slotte moet ik volledigheidshalve hier nog één punt aanroeren, namelijk den regenval in Koetei; van dezen is niets met juistheid bekend, maar het staat vast, dat langdurige droogten in dit land voorkomen. In 1878 hadden zelfs boschbranden dientengevolge plaats en ik herinner mij, dat in 1885 de sultan van Koetei de rieten daken in zijn kraton tijdelijk liet wegnemen om het groote brandgevaar te verminderen, want er was toen in maanden geen regen gevallen.

Keeren wij thans tot de Oeloe-Mahakam terug.

Deze landstreek wordt bewoond door een aantal Dajaksche stammen, waarvan het zielental in 1885 geschat werd op ruim 4500, wonende in 22 dorpen, ongerekend een honderdtal families van zwervende Poenans. De Dajaks der Oeloe-Mahakam zijn in Koetei bekend onder den naam van Bahau-Dajaks, daarbuiten onder dien van Pari-Dajaks; zij hebben van vroeger af eene slechte reputatie gehad wegens hunne sneltochten en waren inzonderheid in het stroomgebied van de Baritoe zeer gevreesd. De onveiligheid in hun gebied was bijzonder groot en eerst in de laatste jaren is daarin door den sultan van Koetei, wiens gezag te voren in 't geheel niet erkend werd, verbetering aangebracht.

Dat die Bahau-Dajaks zoo lang hunne onafhankelijkheid hebben weten te bewaren, moet, behalve aan de omstandigheid, dat niemand van de vorstelijke familie derwaarts mocht gaan, vooral toegeschreven worden aan de moeielijke bevaarbaarheid der Mahakam.

Omtrent dit punt ontleen ik het volgende aan mijn verslag.

De Mahakam-rivier is tot aan de kampong Djoehalang, één uur roeiens boven het straks genoemde Kliwaij, gemakkelijk bevaarbaar, doch daarboven ontmoet men vele moeielijkheden. Wel zijn die tot de laatste kampong der Oeloe-Mahakam, Longglat-lirong-tika, niet bijzonder groot, indien men eene over het algemeen zoo gunstige gelegenheid treft, als waarvan ik heb kunnen profiteeren, maar zoo'n gunstig geval is eene groote zeldzaamheid; slechts in weinige jaren heeft men den lagen waterstand van de maand Augustus 1885. Dit lage water heeft echter ook een groot bezwaar, omdat dan de rivier op enkele plaatsen over de geheele breedte nog geen twee voet diep is, o. a. bij de kampong Longway-Long.

De moeielijkheden in de vaart boven Djoehalang worden veroorzaakt door de vele eilandjes, die men aantreft. Deze stellen versperringen daar, waardoor de, in den drogen tijd reeds sterke stroom, bij eenig hoog water in zóódanige mate versneld wordt, dat hij de grootste omzichtigheid en krachtsinspanning van den schipper eischt; het zijn dan ook alleen de lange, lichte, open loemboengs der Bahau's, die boven Djoehalang te gebruiken zijn. Behalve deze eilanden is er nog een groote hinderpaal in de Mahakam en wel bij een punt in de rivier, Tebah geheeten, ongeveer vier uur roeiens boven Djoehalang, waar eene kronkeling in den stroom samenvalt met aan weerszijden ver vooruitstekende rotspunten. Bij rijzend water ontstaan daar zulke draaikolken, dat het hoogst gevaarlijk, ja dikwerf geheel onmogelijk, is er te passeeren; tal van menschenlevens

en betrekkelijk zeer groote waarde aan handelsgoederen en producten zijn daar reeds verloren gegaan.

In de bevaarbaarheid der Mahakam-rivier is geen verandering gekomen doch in de onveiligheid wel en hierdoor is in de laatste jaren de Oeloe-Mahakam ook niet meer zoo afgesloten gebleven, als zij te voren was. Vooral zijn het Boegineesche handelaren, in Boven-Koetei gevestigd, die de kampongs der Bahau-Dajaks bezoeken. Door hen moet de beschaving bij deze thans nog zeer primitieve bevolking doordringen, althans als men hier van beschaving kan spreken; die Boegineezen toch hebben zelf zulke ruwe zeden, dat zij in menig opzicht niet veel hooger staan dan de Dajaks.

Ongelukkig heeft de meerdere veiligheid, speciaal de oorzaak daarvan, het tegengaan van koppesnellen, het land der Oeloe-Mahakam niet tot meerdere ontwikkeling gebracht. In vroegere tijden, toen het veelvuldig thuisbrengen van afgeslagen hoofden aanleiding gaf tot groote feesten, moest er veel geld wezen; de feestkleeren der vrouwen, meestal van zijde, met laken en kralen versierd, kostten groote sommen; tabak en rijst mochten nimmer ontbreken en die artikelen waren toen door de gevaren, waaraan de handelaren bloot stonden, hoog in prijs.

Die prikkel bestaat thans niet meer; het feestvieren van vroeger komt nog slechts zelden voor en nimmer meer op groote schaal.

Daarbij komt het verspreid wonen van een goed deel der bevolking in de ladangs, ook al een gevolg van de meerdere veiligheid, hetgeen op de algemeene behoeften nadeelig inwerkt.

Hierbij is nog iets te voegen, namelijk dat juist door de Boegineesche handelaren en wel naar de mate, dat dezen zich vrijer hebben kunnen bewegen, onder de Dajaksche bevolking een kwaad is verspreid, dat een ramp voor het land is geworden. Ik bedoel het kaartspel en het houden van hanengevechten. De proporties, welke deze ondeugd heeft aangenomen, zijn inderdaad ongelooflijk. Bijna geen handelstrantactie toch wordt meer met Dajaks aangegaan of eerst moeten de hanen vechten; gaat een troepje Dajaks het bosch in om rotan of getah te zoeken, de vechthaan wordt meegenomen; vaart de Boeginees, zich noemende handelaar, de groote rivier op, bij elke kampong aanleggende en daar korter of langer verblijvende, alleen zijn kapitaal aan vechthanen en kaarten is volgefourneerd, zijne handelsgoederen zijn dikwerf van luttele waarde; ja — het is zóó erg, dat zelfs de zwervende Poenans, met hun minimum van vervoerbare have, geen vechthaan meer kunnen missen.

En - zooals men meestal ziet gebeuren, is het ook bij de Dajaks ge-

gaan, niet de mogelijkheid om veel te kunnen wagen en desnoods oggehinderd te kunnen verliezen, is een prikkel tot werken, in casu tot
het inzamelen der boschproducten geworden, maar wel heeft omgekeerd
de kans om gemakkelijk iets te verdienen dien prikkel uitgedoofd, daarbe
in geval van verlies den ongelukkige aanzettende tot noodlottige berusting in zijne armoede of wel tot kwade praktijken als roof en oplichteri.

Van de Boegineezen hebben de Dajaks ook het vervalschen van en knoeien met de getah-pertjah geleerd, zeer ten nadeele der producenten.

Al is de veiligheid dus verbeterd, zoo heerscht er toch nog weinig welvaart in de Oeloe-Mahakam. Men bepaalt er zich gewoonlijk tot de cultuur van rijst en hiervan plant men meestal te weinig, nog niet eens genoeg voor de behoefte; bovendien mislukken de oogsten dikwerf, zooals ook het geval was geweest, vóórdat ik die streken bezocht.

Dit was voor mij toen een misrekening, want daardoor was ik genoodzaakt mijn reis te bekorten.

De voorraad rijst toch, door den sultan meegegeven, was door de twee honderd man, waarbij zich later nog velen aansloten, spoedig opgebruikt en toen kostte het groote moeite in het onderhoud van zoo velen te voorzien. Na de laatste kampong der Oeloe-Mahakam bereikt te hebben, had ik gaarne mijn geleide teruggezonden, maar hiervan wilden de pangerans, welke mij vergezelden, uit vrees voor den sultan, die aan hen de bewaking van mijn persoon op het hart had gedrukt, niets weten en moest ik dus zelf wel mede terugkeeren.

Moet aan de moeielijke bevaarbaarheid der Mahakam toegeschreven worden, dat de Oeloe-Mahakam zoo langen tijd onbekend is gebleven, in nog veel sterkere mate vindt men dezelfde oorzaak en hetzelfde gevolg ten aanzien van het land boven de Oeloe-Mahakam. Want dit land is nog nimmer door een Europeaan, uitgezonderd Muller, van wien sedert nimmer meer berichten ontvangen zijn, bezocht geworden, en slechts door zeer enkele Koeteineezen. Dit vindt zijne verklaring in de omstandigheid, dat, zooals ik straks reeds zeide, op geringen afstand boven Longglat-lirong-tika, tot waar ik opvoer, een reeks watervallen beginnen, twintig à dertig in aantal, gezamenlijk Kapala-Kiham geheeten, welke eene bijna volkomen versperring in den eenigen weg (den waterweg namelijk) daarstellen.

In mijn rapport schreef ik hieromtrent: "De Kapala-Kiham is voor den "handel een groot bezwaar, daar het niet mogelijk is over dit traject "producten en handelsgoederen in eenigszins belangrijke hoeveelheid te "vervoeren. Dit is duidelijk, als men bedenkt, dat die watervallen alleen

e passeeren zijn, als het water niet te hoog is en niet stijgt (laag water s niet bepaald noodig). Dagen, ja weken lang, moet men soms wachen, totdat de reis te wagen is en dan nog moet, ook bij de allerguntigste gelegenheid, aan elken waterval de geheele boot leeg gemaakt worden, opdat deze zóó aan een touw kan worden opgetrokken of neergelaten. Zelfs in de hoog opgeboeide loemboeng's van de Dajaks boven Kapala-Kiham denkt nooit iemand er aan te blijven zitten of zijn goed niet te ontschepen bij het op- en afvaren over die onstuimige wateren.

"Treft men vrij laag water, dan kan bij zeer groote krachtsinspanning de Kapala-Kiham in drie dagen gepasseerd worden."

Doch al heeft nog nimmer een Europeaan van het land boven de Kaala-Kiham eenige mededeeling kunnen doen, wij weten toch wel iets, ij het ook weinig, door inlandsche berichtgevers.

Wat ik daarvan te weten kwam, maakte ik in mijn rapport bekend; k acht het onnoodig dit alles hier te herhalen, doch van een en ander noet ik wel melding maken.

Het land boven de Kapala-Kiham, dat ik verder gemakshalve Oeloe-Koetei wil noemen, is bewoond door Bahau-, Ma-Soeling-, Kajan- en Penhing-Dajaks; deze laatsten wonen het meest bovenstrooms. Al deze Dajaks behooren, met de Bahau's van Oeloe-Mahakam, met de Modangs langs de Klintjau- en Telèn-rivieren woonachtig, met de Kenja's aan den bovenloop der Kajan-rivier of rivier van Boeloengan gevestigd, met de Segaij- en Kelay-Dajaks van Boeloengan en Berouw, met de Kajans van de Baram en wellicht met nog andere stammen, tot een grooten hoofdstam, waarvan de bakermat, naar het beweren der Koeteische Dajaks (met dat der andere Dajaks ben ik niet bekend), het land van Poh-Kedjin is, aan den oorsprong van de pas genoemde Kajan-rivier.

Hierop kom ik nader terug, doch het zij mij vergund hier de aandacht te vestigen op dien naam van het land van Poh-Kedjin, dat blijkbaar beteekent: het land van "pohon kajoe djin", dat is het land van den geestenboom.

De genoemde Dajaks van bedoelden hoofdstam hebben allen tot merkwaardig punt van overeenkomst, dat zij den berg Tilong of Pilong beschouwen als de laatste étappe hunner zielen op aarde. De Dajaks toch gelooven dat hunne zielen, na den dood van het lichaam, eene reis over de aarde maken alvorens heen te gaan naar het bovenaardsche verblijf, waaromtrent ik van hen echter nimmer inlichtingen heb kunnen krijgen.

In die beschouwing omtrent den Tilong-berg verschillen de genoemde stammen van de Beadjoes en andere stammen van de Zuider- en Oosterafdeeling van Borneo en van de Toendjoeng-, Benoewa- en Bentian-Dajal bezuiden de Mahakam in Koetei wonende, die allen den Goenoe Loemoet, nabij de Boven-Pahoe-rivier, dezelfde rol laten spelen als anderen den Tilong.

Dit punt is van groot belang, omdat het doet veronderstellen, dat Dajaks benoorden en bezuiden de Mahakam of van verschillenden de sprong zijn, of wel dat er met hen in den loop der eeuwen gebeut nissen hebben plaats gehad, waardoor zij, als 't ware, verschillende te ken zijn geworden.

De genoemde Dajaksche stammen benoorden de Mahakam hebben zeden, gewoonten en instellingen veel overeenkomst. Natuurlijk zijn de het minst verbasterd daar, waar men het minst aanraking met vreem lingen gehad heeft, doch zij zijn er ook het moeielijkst te bestudeen Van de Modangs, Bahau's en vooral van de Kajans aan de Baram reeds vrij wat bekend.

De Dajakstammen van Oeloe-Koetei beschouwen zich als geheel onafhankelijk. De sultan van Koetei rekent echter, zooals ik boven reeds zeide, het geheele stroomgebied van de Mahakam tot zijn rijk en wij zien op onze kaarten Oeloe-Koetei ook binnen onze grenzen vallen, maar val de erkenning van ons of des sultans gezag door die stammen is nog nimmer sprake geweest.

Dat zij vijandelijkheden tegen Koetei zullen plegen is niet waarschijnlijk, omdat zij verwant zijn met de stammen van de Oeloe-Mahakam, maar dat de sultan van de Benedenlanden zijn macht en invloed in Oeloe Koetei zal kunnen uitbreiden is evenmin aan te nemen. De Kapala-Kiham is daarvoor een te groot beletsel. Waren die watervallen er niet, gentwijfel of Koetei's vorst zou zijn gezag tot het uiteinde van zijn stroomgebied kunnen doen gelden; thans is dat onmogelijk.

Toch is en blijft het een zaak van het allergrootste gewicht, dat wij direct of indirect invloed krijgen in Oeloe-Koetei, daar deze streek grens aan onze Oeloe-Kapoeas, behoorende tot de Residentie Westerafdeeling van Borneo, en aan Serawak, eene Engelsche kolonie.

De veiligheid in ons eigen gebied wordt door de Dajaks van Oeloe-Koetei thans niet meer ernstig verontrust. Vroeger hebben zij daar wel vreeselijk huis gehouden, zooals men zich aan de Oeloe-Kapoeas thans nog weet te herinneren, en ook nu nog komen wel rustverstoringen op kleine schaal voor; zoo werden nog den 20sten November 1888, twee Silat-Maleiers aan de Oeloe-Mesehai door Penhing-Dajaks vermoord, maar in vallen op groote schaal zijn niet meer te vreezen.

Trouwens al geschiedde dit ook, het zou dan toch maar alleen eene naestie zijn, binnen onze grenzen beperkt.

Maar hetgeen ernstiger is, betreft onze internationale verhoudingen. et schijnt namelijk zeker te zijn, dat tusschen Serawak en Oeloe-Koetei ren lang min of meer officiëele betrekkingen hebben bestaan; ten minste ij werd meegedeeld, dat Penhing-hoofden meer dan eens door Serawakhe bestuurders van Batang-Redjang opgeroepen werden, zooals nu nog :hijnt te geschieden met Pasorang, het hoofd der Kenja-Dajaks van de oven-Kajan.

Voornamelijk waren het quaesties van snellen tusschen Penhings- en atang-Loepars, die Serawak wenschte te beeindigen en gaven de eerstenoemden gewoonlijk gaarne aan de gedane oproepingen gevolg, omdat ok zij belang hadden bij het herstellen des vredes. Dit alles laat zich rijwel begrijpen, want de Selikoe, een der voornaamste affluenten van e Mahakam in Oeloe-Koetei, ontspringt op de Batoe-Tibang tegenover e bronnen van een der zijrivieren der Batang-Redjang, waardoor deze wee wateren den weg vormen tusschen Serawak en het Boven-Mahakamgebied. Deze weg moet niet moeielijk zijn, althans voor de communiatie veel gemakkelijker wezen dan de waterweg over de Kapala-Kiham; andaar dan ook dat de bewoners van Oeloe-Koetei hunne benoodigdweden van Serawak betrokken, waaraan een vrij levendige handel zijn ontstaan te danken had.

Uit vele met elkaar overeenkomende berichten, van verschillende zijden intvangen, moest ik twee jaar geleden echter opmaken, dat toen in de rerhouding van Serawak tot Oeloe-Koetei een groote verandering gekonen was, ten gevolge van een inval eener Serawaksche bola (bende) in aatstgenoemde landstreek, in het jaar 1885.

Oorspronkelijk door Serawak geformeerd en uitgezonden om de bovenste Penhing-kampong van Batang Paron te tuchtigen, is deze bola, na haar doel bereikt te hebben, zonder eenige aanleiding verder getrokken en heeft alle lager gelegen vestigingen, tot en met die der Kajans, verwoest of verbrand, waarbij een groot aantal koppen is gesneld, een aanzienlijke buit gemaakt en vele jongens en meisjes als slaven en slavinnen zijn weggevoerd. Men leefde destijds in Oeloe-Koetei op een goeden voet met de Dajaks van Serawak, had dus aan een inval van die zijde volstrekt niet gedacht en was hoegenaamd niet op tegenweer voorbereid. Aldus, zooals ik zeide, de inhoud van eensluidende berichten van Koetei's en Kapoeas' zijde, waarop berustte de mededeeling, dat sedert dien tijd de vriendschappelijke verhouding van vroeger geheel veranderd was

en een groote verbittering in Oeloe-Koetei tegen Serawak heerscha. Of de toestand in de laatste twee jaren weer veranderd is, weet it niet, doch doet ook minder ter zake, omdat hierdoor het feit, dat De jaks van Oeloe-Koetei van tijd tot tijd Serawak overlast aandoen en de nu en dan verplicht is die streek te tuchtigen, niet vervalt en juist de feit van dien aard is, dat men het wel goed onder de oogen mag zin en er niet los over heen praat.

Want willen wij de Oeloe-Koetei tot ons grondgebied rekenen dan is het ook onze plicht de bewoners van dat land te beschermen tegen vijadelijke aanvallen van buiten en er tegen te waken, dat zij, zonder gevaar voor bestraffing onzerzijds, bevriende buren overlast aandoen.

Het laatste is een punt van internationaal belang en mag daarom niet veronachtzaamd worden; toch is dit tot heden nog altijd gedaan, omdat onzerzijds nimmer gestreefd is naar het verkrijgen zoo niet van macht dat althans van invloed in Oeloe-Koetei.

De vraag is echter hoe kunnen wij invloed in Oeloe-Koetei krijgen, als dat land van Beneden-Koetei zoo moeielijk te naderen is. Deze vraag wensch ik straks te bespreken, wanneer ik het een en ander van Oeloe-Kapoeas heb medegedeeld, doch alvorens daartoe over te gaan, moet ik nog even terugkomen op het reeds genoemde land van Poh-Kedjin aan den bovenloop der Kajan-rivier, die beneden Tandjoeng-Pelas, de hoofdplaats van het sultanaat van Boeloengan, aan de oostzijde van Borneo in zee valt.

Van het land van Poh-Kedjin of Oeloe-Kajan heb ik in het meergenoemd reisverslag een en ander meegedeeld, dat door mij vernomen was van een zendeling van den sultan van Koetei, Hadji Assan geheeten, die het had bezocht.

Het schijnt, ook uit later aan de Boven-Kapoeas ontvangen berichten, dat de Oeloe-Kajan alleen door Kenja-stammen bewoond wordt, waarvin het zielental opgegeven wordt 43,750 te bedragen, allen als hun hoofd, of wel als het voornaamste hunner hoofden, Pasorang van de kampong Mauserkennende.

Oeloe-Kajan moet een hoogland zijn, dat door terreinhindernissen gers gemakkelijke communicatie met de omliggende landen heeft.

Op de bestaande kaarten staat het geteekend als behoorende tot Boeloengan, doch dit is onjuist, want het behoort evenmin tot dit rijk als Zwitserland tot Nederland.

Het lgebied van den sultan van Boeloengan toch is beperkt tot & kuststreek; zelfs de Segaij-Daiaks, beneden de Kenja's aan de Kajar

ivier wonende, zijn zóó geheel onafhankelijk van dien vorst, dat, wanneer deze in het door hen geoccupeerde gebied rotan of getak-pertja wil
aten inzamelen, hij daarvoor eerst van hen vergunning moet hebben.
Met de Segaij's komen de bewoners van Boeloengan nog wel in aanaking, maar met de Kenja's in 't geheel niet. Er schijnt in de Kajanivier een hindernis te zijn, die veel grooter is dan de Kapala-Kiham in
le Mahakam. Men spreekt van een berg, dien het water doorboord heeft
en waar het door heen stroomt. De waarheid hiervan kan ik niet belissen; zelfs van het land der Segaij-Dajaks weten wij nog niets, maar op
grond van verschillende berichten mag men aannemen, dat communicatie
susschen het boven- en benedenstroomgebied der Kajan-rivier noch bestaat noch te krijgen is.

Intusschen hebben de Kenja's wel gemeenschap naar onze zijde namelijk met de Dajaks van Koetei. Men kan toch de Oeloe-Kajan bereiken koor van de Mahakam de Boh-rivier, die in den hoofdstroom op één dagreis boven de Kiham-Halok, den eersten waterval der Kapala-Kiham, nitmondt, op te varen. Deze reis is echter zeer moeielijk want van den mond der Boh-rivier is het 8 dagen stroomopwaarts varen, dan 3 dagen loopen over voortdurend golvend, zeer steenachtig terrein, eer men het hoogstbevaarbare gedeelte der Laja, een rechterzijtak van de Kajan, bereikt.

Het zal geen verwondering baren, dat een land zóó afgelegen en van onze zijde zóó moeielijk bereikbaar, van ons geheel onafhankelijk is en dat er, redelijkerwijs gesproken, ook geen mogelijkheid bestaat, derwaarts ons gezag uit te breiden. Toch valt het land binnen onze grenzen. Wanneer aan gene zijde dier grenzen geen Europeesche nabuur was, zou dat onbereikbare territoir eene vrij onverschillige zaak zijn, doch nu het grenst aan een land onder Engelsche souvereiniteit is het eene vraag, wel der overweging waard of wij op het bezit van Oeloe-Kajan prijs moeten stellen, dan wel of het niet beter is bij voorkomende gelegenheid te verklaren, dat wij die landstreek niet als ons grondgebied reclameeren en dit ook niet wenschen te doen.

De eenige moeielijkheid, aan het niet reclameeren van de Oeloe-Kajan verbonden, ligt in de omstandigheid, dat hierdoor het aannemen van de waterscheiding als grens tusschen de Nederlandsche en Engelsche bezittingen komt te vervallen, doch dit bezwaar is niet zoo groot als het behoud van dat onzerzijds onbereikbaar binnenland; want dat behoud kan aanleiding geven tot verwikkelingen en het is verstandiger die te voorkomen dan af te wachten. De nabijheid der machtige, strijdlustige Kenja's

toch is voor de aangrenzende Engelsche bezittingen een gevaar, kan k thans een gevaar worden; van daar dan ook dat, zooals ik straks red zeide, van Serawak uit pogingen aangewend worden om met Pasoran aanraking te krijgen en betrekkingen aan te knoopen.

Ik moet nog opmerken, dat eenige jaren geleden onderhandelinge zijn gevoerd tusschen genoemden Pasorang en den Sultan van Koez over het verhuizen van de Kenja's naar het stroomgebied der Mahakan Mocht dit gebeuren, hetgeen ik niet voor waarschijnlijk houd, dan zo van zelf de reden voor het prijsgeven van de Oeloe-Kajan ophouden i bestaan.

Laat ons thans trachten van de westzijde van Borneo naar het cen trum door te dringen. Over Engelsch grondgebied zou de afstand var dat centrum naar de kust niet groot zijn, maar willen wij ons op Nede landsch terrein houden, dan hebben wij eene lange reis te maken, door dat wij de groote Kapoeas-rivier van hare monding beneden Pontianak de hoofdplaats der Residentie Westerafdeeling van Borneo, tot nabij has oorsprong hebben op te varen. Ik stel mij echter voor het straks nade te noemen Boenoet als punt van uitgang te nemen, omdat het land dat beneden reeds beschreven werd, o. a. in Borneo's "Westerafdeeling' van Veth.

Maar terwijl wij bezig zijn in gedachten naar Boenoet op te stoomen circa 85 uur, mogen enkele algemeene opmerkingen over het gebied dat wij doortrekken, eene plaats vinden.

Wanneer wij de Mahakam ter oost- en de Kapoeas ter westzijde op varen, dan hebben wij voor alles op een paar belangrijke verschilpunte te wijzen. Het geheele stroomgebied der Mahakam toch behoort aan ét inlandsch vorst, terwijl wij langs de Kapoeas verschillende rijkjes pæseeren.

Wel zijn èn de sultan van Koetei èn de bestuurders dezer rijkjes van de Kapoeas allen zoogenaamde contractuëele vorsten, leenmannen van het Nederlandsch-Indische Gouvernement en staat het grondgebied van allen niet onder rechtstreeksch gezag, maar in de politiek ten opzicht der vorsten ter oost- en ter westkust gevolgd, is een hemelsbreed verschil

Met Koetei toch hebben wij ons zoo min mogelijk bemoeid; zelfs of de naleving van het contract is nimmer sterk aangedrongen; willekeurig belastingheffingen zijn niet tegengegaan en ook is het slavenbezit niet bemoeie lijkt; de rechtspraak over eigen onderdanen is bij den vorst gebleven.

Langs de Kapoeas, het rijkje Pontianak buiten beschouwing gelates,

hebben wij de reeds zoo nietige vorsten nog kleiner gemaakt; hunne inkomsten zijn besnoeid; in het ontduiken hunner verplichtingen van dienstbaarheid hebben wij de onderdanen gesteund; den vorsten is de rechtspraak ontnomen; wel is waar kunnen zij nog overtredingszaken buiten de plaatsen, waar Gouvernementsambtenaren gevestigd zijn, berechten en doen berechten, maar daar alleen dwangarbeid en gevangenisstraf mag uitgesproken worden, is deze bevoegdheid eene doode letter, omdat men van een gevangeniswezen geen begrip heeft.

Het gevolg van deze verschillende politieke richtingen is geweest, dat wij in Koetei hebben een machtig vorst, die in staat is iets te doen, die een bondgenoot is, welke van groot nut kan zijn, zooals hij reeds meermalen getoond heeft.

Langs de Kapoeas niets dan machtelooze vorstjes, verbitterd over de verkorting hunner macht, niet in staat het bestuur te voeren en aan wie wij in moeielijke omstandigheden niets hebben.

Toen in 1864 een der oproerlingen van het Bandjermasinsche in het rijk Sintang opstand verwekte, hadden wij aan het Inlandsch Bestuur aldaar nagenoeg niets; onze eigene militaire macht had op het terrein, waar gestreden moest worden, weinig succes en wij mochten ten slotte blij zijn, dat de hoofdopstandeling stierf en daarmee de rust terugkeerde.

Toen in 1885 Pangeran Perbatasari, eerste bevelhebber van den straks reeds genoemden Goesti Mat Seman, met eene bende van 80 gewapende volgelingen de grenzen van Koetei overschreed, werd hij met de zijnen, op last van den sultan, omsingeld en naar Tenggaroeng opgebracht en aan het Gouvernement uitgeleverd.

Naar Koetei was nog nimmer eene militaire expeditie noodig (in 1845 werd Tenggaroeng door onze marine verbrand, maar dit was niet verdiend), in de afdeeling Sintang drie maal: 1857—1859, 1864—67 en 1874. In Koetei werd nog nimmer op een ambtenaar geschoten; in Sintang werd in 1874 de assistent-resident Stoll doodelijk en in 1887 de controleur Liebert ernstig verwond; in Koetei is geen garnizoen; langs de Kapoeas is een niet onbelangrijke bezetting; Koetei brengt aan het Gouvernement nagenoeg niets op maar kost ook weinig; het stroomgebied der Kapoeas brengt niet veel meer op doch vordert groote uitgaven.

Wellicht veronderstelt men, dat de gevolgen van onze politiek aan de Kapoeas althans der bevolking ten goede zijn gekomen en de toestand van deze gunstig afsteekt tegen dien van het volk, dat gebukt gaat onder het bestuur van den machtigen despoot van Koetei. Doch deze veronderstelling is onjuist, want aan beide rivieren is de welvaart even ge-

ring en zoowel aan de Kapoeas als aan de Mahakam zijn de onderdanen blootgesteld aan knevelarij en misbruik van gezag van echte en onechte vorstentelgen, waaronder vooral de Dajaksche stammen te lijden hebben.

De sultan van Koetei waakt misschien nog meer en beter tegen te groote afpersingen dan wij; hij hoort meer dan Europeesche ambtenaren en zijn rechtspraak is meer afdoende en meer crimineel dan de onze. Aan de Kapoeas moeten de ambtenaren doen hetgeen in Koetei de sultan doet, en de hulpmiddelen van het bestuur zijn geheel onvoldoende voor de taak, die men op zich genomen heeft.

Ik zal mij tot bovenstaande algemeene beschouwingen bepalen en thans Boenoet opzoeken. Ik laat dus, Pontianak verlatende, ter linkerzijde Landak liggen, bekend om de goede diamanten, die men er vroeger gevonden heeft en waar thans tal van mijnbouwconcessies zijn aangevraagd. Ik ga het onbeduidende Tajan voorbij, evenals Meliouw, waar de vorst, een gewezen inlandsch ambtenaar van Batavia, zijn ontslag genomen heeft om opnieuw in ondergeschikte Gouvernementsbetrekking te treden, daar hij van de opbrengsten van zijn rijk niet konde leven; ook van Sanggouw, Sekadouw en Sintang zal ik niet anders zeggen dan dat Sintang de hoofdplaats van een gelijknamig rijk en de standplaats van een assistent-resident is; eene versterking ligt er aan de samenvloeiing van de Melawi en de Kapoeas, tegenover het Chineesche kamp en de woning van den Vorst of Panembahan; de Melawi-rivier doorstroomt een nog weinig bekend gebied, dat zich uitstrekt tot de grenzen van de Zuideren Oosterafdeeling van Borneo.

Boven Sintang ligt het rijkje Silat; ik passeer dit evenals Smitouw, de kleine kampong, die thans de standplaats is van den controleur der onderafdeeling Boven-Kapoeas.

Ik ga ook de monding der Tawang-rivier voorbij, die de voornaamste toe- en afvoerweg is voor het water van het uitgestrekte merengebied dat ten noorden van de Kapoeas gelegen is en dat, behalve door genoemde rivier, ook nog gevoed wordt door de Ambalouw-Lebojan, alsmede door de verschillende stroompjes, die op het grensgebied van Serawak ontspringen.

Ten noorden van deze meren wonen de beruchte Batang-Loepar-Dajaks, het deel van den in Serawak wonenden stam, dat zich op Nederlandsch grondgebied heeft gevestigd, in wier midden, te Nanga-Badouw nabij de grenzen, een aspirant-kontroleur, ondergeschikt aan den chef der onderafdeeling Boven-Kapoeas, zijne standplaats heeft. Dat Nanga-Badouw is wel een uithoekje te noemen, want om er heen te gaan moet men eerst van af Smitouw, zelf 70 uur stoomens boven Pontianak gelegen, door de

Tawang en het Seriang-meer 7 uur stoomen tot Poeloe-Madjang, van daar 5 uur in een sampan (klein inlandsch vaartuig) doorroeien tot Koewala-Pesaja en dan nog 3 uur loopen. En — maakt men zóó de reis dan heeft men nog geen reden tot klagen, want in den drogen tijd, wanneer de meren, op ondiepe geulen na, geen water bevatten, valt aan stoomen niet te denken; dan is een kleine sampan nog maar het eenige vervoermiddel en dit nog wel voor een klein deel van het traject, zoodat het te voet af te leggen gedeelte verreweg het grootste is.

Boven de monding der Tawang passeeren wij, de Kapoeas opstoomende, nog Soehait, welks vorst sedert eenige jaren op reis is om handel te drijven, omdat hij, naar zijn zeggen, in zijn rijk niet genoeg te eten had; Selimbouw, waar vrij goede steenkolen gevonden worden; Piasa een paskwil van een rijk, waar de vorst, een paar jaar geleden, niet eens een tiental menschen kon bijeenbrengen om bij de opname zijner grenzen behulpzaam te zijn, en Djonkong, niet veel beter dan het voorgaande.

Het laatste Maleische rijkje is Boenoet; de hoofdplaats, die denzelfden naam draagt, is gelegen aan de uitmonding van eene gelijknamige rivier in den hoofdstroom. Het Maleische deel der plaats, met inbegrip van de weinig vorstelijke woning van den aan opium en dobbelspel verslaafden jongen zelfbestuurder, heeft, evenals andere gelijksoortige plaatsen, een armzalig voorkomen, maar het nieuwe Chineesche kamp ziet er netter en welvarender uit.

Het rijkje Boenoet is waarschijnlijk het laatst gesticht. Het vorstenhuis is, evenals die van Piasa en Djongkong, eene vertakking van dat van Selimbouw. De tot Boenoet behoorende Dajaks, — meerendeels wonende langs de Boenoetrivier en hare takken, die gedeeltelijk ontspringen op het Mahdi-gebergte, dat de grenzen uitmaakt met de Boven-Melawi, gedeeltelijk naderen tot de linker-affluenten van de straks te noemen Mandei-rivier, — zijn niet met geweld door de Maleische bevolking ten onder gebracht en zijn dientengevolge ook niet cijnsbaar. Naar alle waarschijnlijkheid is oorspronkelijk een of- en defensief verbond tusschen die Dajaks met Moehamedaansche kolonisten van Selimbouw aangegaan, waarvan de eene partij van lieverlede de suprematie over de andere heeft weten te krijgen, zoodat uit de eerste, in navolging van hetgeen in de oudere rijkjes langs de Kapoeas is geschied, een vorstenhuis is ontstaan, dat langzamerhand zijne macht en zijn aanzien heeft uitgebreid, zooals dit thans nog gebeurt.

Stoomen wij nu van Boenoet de Kapoeas op dan komen wij, na 21/2

uur, aan de monding van de Ambalouw-Kapoeas en een weinig later aan die der Palin-rivier. Beide zijn rechterzijrivieren van den hoofdstroom en loopen, evenals de boven reeds genoemde Ambalouw-Lebojan, die in de meren uitmondt, gezamenlijk evenwijdig aan den hoofdstroom.

Van dit drietal is de Ambalouw-Kapoeas verreweg de grootste; haar oorsprong ligt het verst verwijderd, naar men zegt tegen de Serawaksche grenzen.

De twee Ambalouw-rivieren en de Palin vormen te samen een eenigszins aaneengesloten geheel, dat nog niet beschreven werd.

De reis langs de Kapoeas vervolgende komt men, na 5 uur stoomens, aan de monding der reeds genoemde groote linker-zijrivier, de Mandei. Ik stoomde haar een paar uur op tot Nanga-Kalis; hooger op hebben zich Poenan-Dajaks gevestigd; ook deze zijn nog nagenoeg onbekend.

De Mandei loopt eveneens parallel aan de Kapoeas; zij ontvangt een gedeelte van haar water van den berg, dien men, bij het opvaren der Kapoeas boven Boenoet, herhaaldelijk te zien krijgt, den merkwaardigen Boekit-Tilong. Zij omsluit met hare zijtakken dezen berg zelfs van zeer nabij, hoewel de oorsprong van haar hoofdstroom, die hem aan den vóórkant (de noordwestzijde) passeert, vele dagreizens verwijderd is.

Stoomt men van de monding der Mandei-rivier verder, dan treft men, na nog 3 uur, eene nieuwe vestiging van Kantoek-Dajaks aan. De Kantoekstam woonde eens aan de Ampanang. Hij was daar toen nog vrij talrijk, maar had van den veel machtiger stam der Batang-Loepar-Dajaks erg te lijden. Herhaaldelijk zijn wij hun te hulpe gekomen en het moet erkend worden, dat zij dien bijstand waardig waren door hunnen grooten persoonlijken moed en hunne erkentelijkheid; de gehechtheid der Kantoeks aan ons bestuur toch is steeds exceptioneel groot geweest.

Ongelukkig echter hebben wij hen tegenover hunne vijanden lang niet afdoende beschermd en, wat nog erger is, bij eene partieele grensregeling in 1881 hebben wij het door hen bewoonde stroomgebied op quaestieuse gronden, misschien zelfs geheel ten onrechte, aan Selimbouw toegewezen. Sedert hebben de Kantoeks zich verstrooid; aan de Ampanang is niemand hunner overgebleven; gedeeltelijk hebben zij zich aan de Sebroewangrivier (beneden Smitouw), gedeeltelijk tegenover Selimbouw aan de Kapoeas, gedeeltelijk in Boenoet, gedeeltelijk weer elders neergezet, echter, naar 't schijnt, zonder bepaalde rust te vinden.

Van die Kantoeks nu heeft zich een paar jaar geleden eene kolonie aan de Kapoeas boven de Mandei gevestigd en toen ik, in gezelschap van den controleur van Boven-Kapoeas, daar den 4den Mei 1888 passeerde, heb-

ben wij haar een bezoek gebracht. Dit heeft mij niet gespeten, want nog nimmer heb ik een kampong bezocht, waar de bevolking zóó ondubbelzinnige blijken van vriendschap gaf. Bij het naderen der vestiging toch werd van hare twee landingplaatsen als om strijd gewenkt en geroepen ten einde ons tot landen te bewegen en, zoodra wij aan wal waren, werden wij uitgenoodigd een huis binnen te gaan, waar alras ieder, die in de kampong was, zich verzamelde; de meesten hadden zich in de haast behoorlijk gekleed (op zijn Dajaksch natuurlijk), vrouwen en kinderen brachten wat rijst, een ei of een kip. Allen hadden werkelijk een glans van genoegen op het gezicht, zooals men weinig bij inlanders aantreft en tot groot pleizier van de omstanders trad eene vrouw naar ons toe en zwaaide een paar maal met een kip over onze hoofden, zich daarbij verontschuldigende met te zeggen, dat men zoo blij was over ons bezoek.

Of die vestiging zal blijven bestaan is nog lang niet zeker. De Kantoeks zijn nu eens aan het heen en weer trekken gewoon geraakt; bovendien lijkt het door hen uitgekozen terrein mij weinig gunstig toe. Het zou anders zeer wenschelijk zijn, indien wij dien geheelen stam van trouwe vrienden weer ergens blijvend konden vereenigen en wel op direct Gouvernements grondgebied.

Ongeveer 4 uur stoomens boven de kampong der Kantoeks ligt Poetoes-Sibouw, eene half Maleische half Dajaksche nederzetting, aan de samenvloeiing van de Sibouw met de Kapoeas. Poetoes-Sibouw kan men de
hoofdplaats noemen van de eigenlijke Boven-Kapoeas, die ik verder OeloeKapoeas wil noemen in tegenoverstelling van de geheele onderafdeeling
Boven-Kapoeas, die ook de Maleische staatjes tot en met Silat omvat.

Men is te Poetoes-Sibouw op direct Gouvernements grondgebied; de grenzen hiervan met Boenoet zijn nog niet vastgesteld, maar men neemt aan dat Boenoet zich op den linkeroever der Kapoeas tot de Mandei en op den rechteroever tot beneden de Ambalouw-Kapoeas uitstrekt; wat daarboven ligt is direct Gouvernements grondgebied.

Hoe die bovenstreken dit eigenlijk geworden zijn en daardoor hare bewoners tevens rechtstreeksche Gouvernements onderdanen is moeielijk te zeggen; door eerste inbezitname is het natuurlijk niet geschied, evenmin door verovering; en contracten omtrent den afstand zijn ook niet gesloten. Doch hoe dit ook zijn moge het staat vast dat 's Gouvernements gezag in de Oeloe-Kapoeas feitelijk erkend wordt en dat gegeven bevelen behoorlijk worden opgevolgd.

Poetoes-Sibouw is een niet onbelangrijk plaatsje, al is het uiterlijk ook onaanzienlijk, omdat handelsvaartuigen van Maleiers en Chineezen tot

daar mogen opvaren. Gaarne zouden handelaren zich te Poetoes-Sibouw vestigen, vooral Chineezen, maar tot nu toe werd dit door het bestum steeds verboden, omdat in deze afgelegen streken nog niet afdoende voor de veiligheid van personen kan gewaakt worden.

Het zijn nu meestal handelaren van Boenoet, die, als de tijden het toelaten, zooals tegenwoordig gewoonlijk het geval is, voor eenige maanden naar Poetoes-Sibouw gaan; dikwerf reizen zij zelfs nog verder en bezoeken de omwonende Dajaks in hunne woonplaatsen.

De handel te Poetoes-Sibouw schijnt veel voordeel op te leveren; de handelaren weten er, door onderlinge afspraak, de prijzen der producten vrijwel te dwingen (hierover klaagden althans verscheidene Dajaks) en met maten en gewichten zoo mogelijk nog erger te knoeien dan elders; trouwens de Dajaks zelf, wanneer zij kunnen, verzuimen ook niet de handelaren in den nek te zien. Daarbij komt dat die nabij Poetoes-Sibouw wonende Dajaks meerendeels niet onbemiddeld zijn; in de meeste woningen vindt men betrekkelijk groote waarden aan koperwerk (bekkens = gong, tawa-tawa, tarei, van verschillende afmetingen en lilla's). Wel is dit een dood kapitaal, maar men komt er toch niet toe het te verzamelen noch te bewaren, zoolang andere dringende behoeften onvervuld zijn. Deze andere behoeften zijn die aan zout, tabak, lijnwaden, aardewerk, enz., welke artikelen dan ook het meest opgevoerd worden, veelal om in ruil daarvoor rotan te bekomen.

Dit boschproduct is het eenige dat nog in vrij aanzienlijke hoeveelheid, al is het ook niet meer in de nabijheid der kampongs, aangetroffen wordt; getah-pertja vindt men nog slechts in zóó geringe hoeveelneid, dat men zeggen kan dat zij opgehouden heeft eene rijke bron van volkswelvaart als weleer te zijn.

Handel tegen gereed geld komt weinig voor, omdat men dit bij de Dajaks slechts bij uitzondering aantreft; ook à contant worden weinig zaken afgedaan; meestal moet de handelaar beginnen met crediet te verleenen en gaat de Dajak pas daarna uit om boschproducten te verzamelen, ten einde zijne schulden aan te zuiveren; alleen als de rijstoogst goed geslaagd is, worden tegen het product daarvan koopwaren à contant geruild.

Poetoes-Sibouw is de zetel van een vertegenwoordiger (wakil) van het bestuur, zekeren Raden Padoeka, een voornaam inlander uit Selimbouw geboortig. Tal van jaren geleden toch is het noodig voorgekomen, hier iemand te hebben, bij wien de bevolking zaken konde aanbrengen, die zelf in kleine quaesties konde beslissen, aan de bevolking bevelen van het bestuur overbrengen en omgekeerd dit op de hoogte houden van

hetgeen er voorviel. Men leefde toen in een onrustigen tijd; de Batang-Loepars, boven genoemd, verspreidden met hunne sneltochten op groote en kleine schaal heinde en verre schrik en onrust. De controleur van Boven-Kapoeas, eerst te Selimbouw later te Poeloe-Madjang gevestigd, was in den omtrek der meren altijd door geoccupeerd, 't zij om moordaanslagen te verijdelen, 't zij om die te bestraffen, dan wel om vrede te sluiten en te verzoenen.

Als vervoermiddel over zoo groote afstanden had hij enkel te beschikken over een roeivaartuig. Naar Poetoes-Sibouw te gaan behoorde dan ook tot de groote uitzonderingen; in geen geval kon er voor hem sprake zijn van eene geregelde controle dier ver afgelegen streken. Dat onder die omstandigheden een gevolmachtigde van het bestuur te Poetoes-Sibouw noodig was, is duidelijk en het mag wel een geluk genoemd worden, dat men in de keuze van een persoon zoo goed geslaagd is. De eerste als zoodanig gekozen was Raden Padoeka en deze, zooals ik zeide, is het nog; hij is thans oud en afgeleefd en kan weinig meer presteeren, maar de, over 't geheel genomen, bevredigende stand van zaken te Poetoes-Sibouw is zeker voor een goed deel aan hem te danken.

De twee voornaamste ingezetenen van Poetoes-Sibouw, na Raden Padoeka, zijn Raden Laksamana en Raden Mas, twee Taman-Dajak-hoofden, eigenlijk boven Poetoes-Sibouw thuis behoorende, die beiden tot den Islām zijn bekeerd. Dat zij niet meer in hunne kampongs verblijf houden, is aan het bestuur te danken, dat steeds er naar gestreefd heeft en nog streeft om de Dajaks buiten Moehamedaanschen invloed te houden; vandaar ook, dat de vestiging van Maleiers in de Dajaksche kampongs zoo veel mogelijk tegengegaan wordt.

Of dit op den duur wat zal geven, meen ik te moeten betwijfelen; wij kunnen den voortgang van den Islām bemoeielijken maar niet beletten; wel langzaam, doch niet minder zeker, maakt hij vorderingen.

In de straks te noemen groote Kajan-kampong Tandjoeng-Karang vertelde het hoofd Igouw, dat zijn oudste zoon naar Boenoet was om daar de Poewasa (vastenmaand) door te brengen.

Op mijne vraag waarom hij toegestaan had, dat die zoon tot den Islām overging, terwijl hijzelf toch den godsdienst zijner voorvaderen had bewaard, gaf hij tot antwoord. "Ik heb gezien, dat het geloof onzer "ouders ons toch geen voordeel aanbrengt, ik wil nu wel eens beproeven "of mijne kinderen bij een ander geloof niet gelukkiger zijn." Blijkbaar was Igouw zelf ook reeds half bekeerd; hij had reeds gehoord naar den vogelaar met zoet gefluit, hij had geluisterd naar Moehamedanen, die

vooral het verkrijgen van meerder stoffelijk voordeel als aansporing tot het omhelzen van het nieuwe geloof in 't vooruitzicht stellen.

Trouwens daar werken verschillende oorzaken samen om van de Oeloe-Kapoeas een vruchtbaren akker voor het zaad van den Islam te maken.

In de eerste plaats is daaronder te noemen, dat door het tegengaan van het koppesnellen de hoeksteen van het Dajaksche geloof ondermijnd is. Zooals bekend is, acht de Dajak al het lief en leed, dat hem overkomt, het werk van goede en booze geesten; van offers aan die geesten, 't zij tot aanroeping, 't zij tot bevrediging, 't zij met welk doel ook, hangt, om zoo te zeggen, zijn leven aan elkaar; geen gebeurtenis van eenig belang of zij vordert zoo'n offer; zonder dit kan geen zegen rusten noch op iemands kroost, noch op zijn huis, noch op zijn veld, noch op zijne jacht.

Die steeds noodige offers nu waren menschenoffers; zij werden verkregen door koppesnellen; dit was de religieuse daad bij uitnemendheid en deze is verboden, ja, onmogelijk geworden. Kan het bevreemden, dat daardoor aan het geloof der Dajaks een geweldige slag is toegebrach; dat reeds daardoor de geesten min of meer hebben uitgediend? Zij, de Dajaks, moeten het immers wel zonder hen stellen, want zij kunnen hen toch niet meer bevredigen; eerst á contre coeur, later uit gewoonte laten zij hen loopen.

Wij kunnen ons voorstellen, dat zoo lang het goed gaat, op die onverschilligheid ten opzichte der geesten niet gelet wordt; dat daaruit althans geen conclusies getrokken worden, maar dat, als het niet goed gaat, zooals in geval van misoogst, ziekten of tegenspoeden van anderen aard, daaruit ontevredenheid over het half uitgediende geloof en behoefte aan een ander ontstaat. Het bovenvermelde antwoord van Igouw houd ik voor karakteristiek; velen denken, zooals hij sprak. Hierbij moet niet vergeten worden, dat het koppesnellen in het sociale leven diep ingreep. Zooals ik reeds zeide, gaf elke goed geslaagde sneltocht aanleiding tot feesten; deze volgden elkaar op, was het niet in de eigen kampong dan bij bevriende buren. Van den eenen roes kwam men in den anderen; heldendaden vielen te bespreken en te verheerlijken, oeseningen in den wapenhandel waren de meest gelieskoosde uitspanningen, het bezit van een uitmuntend zwaard de grootste rijkdom.

Hierin is nu ook verandering gekomen; dat tijdperk van glorie is voorbij, ook dit is een reden om van het oude geloof los te worden, daaraan niet meer te hechten.

Het eene met het andere samenvattende, kan men gerust besluiten,

dat, door het afnemen van het koppesnellen op het gebied van het geloof, het terrein meer en meer begint braak te liggen en beschikbaar te komen voor andere cultuur.

Eene tweede oorzaak voor gemakkelijke verspreiding van het Moehamedaansche geloof in de Oeloe-Kapoeas zie ik in de door mij over 't algemeen waargenomen hoogschatting van Moehamedanen door Dajaks. Een sterk sprekend voorbeeld daarvan herinner ik mij van de Mahakam-Dajaks, die bij gelegenheid van een brand, waar eenige Moehamedanen hulp hadden verleend, luide verkondigden, dat alléén "haloks" (de naam voor Moehamedanen) die ramp tot staan hadden kunnen brengen.

Een dergelijk feit was ik niet in de gelegenheid in de Oeloe-Kapoeas op te merken, maar ik vernam aldaar toch ook, evenals aan de Mahakam, dat bij Shamanen 1)-bijeenkomsten Moehamedanen streng geweerd worden, uit vrees dat anders door hun invloed de geesten zullen weigeren neer te dalen en daardoor de hulp van dezen zal uitblijven.

Vele feiten van minder belang wijzen er ook op, dat de Moehamedaan tegenover den Dajak eene hooge plaats inneemt; de Dajak zelf gevoelt dit; de Moehamedaan verzuimt bovendien niet het hem te doen gevoelen. De Dajak van Oeloe-Kapoeas weet trouwens ook, dat in al de rijken benedenstrooms de machthebbenden Moehamedaanen zijn en de Dajaks slaven. De Moehamedaansche onderdanen in die rijkjes zijn allen zonder onderscheid in veel gunstiger condities dan de Dajaksche. Daar dit alles bekend is, zoo kan het niet missen of daaruit moet voor den Dajak een zekere lust geboren worden om ook tot die bevoorrechten te behooren.

Om het bovenstaande plastisch uit te drukken, kan men zeggen, dat de afname van het koppesnellen en de daarmee gepaard gaande verzwakking van het animistisch²) geloof den Dajak eenerzijds van boeien bevrijdt; zijne hoogschatting van den Moehamedaan hem anderzijds aantrekt.

Merken wij van den kant der Dajaks eene zwenking, want meer is het eigenlijk nog niet, naar het Moehamedanisme op, zoo wordt hiervan van Moehamedaansche zijde niet geprofiteerd om in de Oeloe-Kapoeas de ware leer te verkondigen.

Onwillekeurig is men geneigd te denken, dat speciaal van de zijde van Boenoet, dat aan de Gouvernementslanden grenst, propaganda voor den Islam gemaakt wordt en natuurlijk de bekeeringen, die in de Oeloe-Kapoeas plaats hebben, gaan ook meerendeels van Boenoet uit, maar

¹⁾ Shamanen = priesters, dokters, geestenbezweerders, spiritisten.

²⁾ Het oude heidensche geloof.

van eene bepaalde propaganda is, dunkt mij, toch geen sprake, ja, is het tegendeel zelfs het geval. Dit is te verklaren door de omstandigheid, dat een Maleisch vorst veel meer voordeel heeft van Dajaksche dan van Moehamedaansche onderdanen. De eersten kunnen gemakkelijk van hunne inferioriteit overtuigd worden; zij hebben immers geen enkel punt van gelijkheid met hunne geloovige meerderen, zij zijn in den vollen zin des woords "taillable et corvéable à merci"; met de laatste categorie gaat dit niet zoo gemakkelijk; de gelijkheid van geloof leidt hier, zoo niet tot eene gelijkheid van macht en recht, dan toch tot groote individueele vrijheid, die inheemsch schijnt te zijn. Menig Maleisch vorst langs de Kapoeas gaat dan ook de bekeering zijner Dajaks zoo veel mogelijk tegen, ja, er wordt in sommige gevallen eene boete of schadeloosstelling voor den overgang tot den Islām geëischt.

Wat nu de Oeloe-Kapoeas betreft, wel staat deze niet onder Boenoet en is er ook geen sprake van, dat zij aan dit rijk zal worden toegevoegd, maar ongetwijfeld hoopt Boenoet daarop en tracht het de verwezenlijking van die hoop te provoceeren door zich onmisbaar te maken. Vandaar die ijver om zich met de zaken van Oeloe-Kapoeas te bemoeien en daar invloed te krijgen.

Om de redenen, boven ontvouwd, kan Boenoet alleen verlangen naar een Dajaksche Oeloe-Kapoeas (een Moehamedaansche O. K. kan voor Boenoet weinig aanlokkends hebben) en, met het oog op deze illusies, zal, naar mijne meening, Boenoet eene propaganda voor den Islam in genoemde streek eer tegenwerken dan aanmoedigen.

Evenwel zijn hierop uitzonderingen; zoo zijn huwelijken tusschen Boenoetsche vorstentelgen en voorname Dajaksche meisjes een zeer geschikt middel om invloed te verkrijgen; hierdoor toch kan Boenoet zich mengen in de huishoudelijke aangelegenheden der Dajaks en krijgt het eene stem, dikwerf eene overwegende, bij hunne beraadslagingen. De Dajaksche meisjes, met Maleiers huwende, moeten echter den Islam omhelzen.

Ook kan soms eene bekeering van hoofden gewenscht worden om dezen meer macht en aanzien tegenover hunne ondergeschikten te geven; die macht bij de Dajaks is, zooals men weet, over het algemeen zeer gering. Maar al deze gevallen van bekeering, hoewel in het belang van Boenoet's politiek, zijn uitzonderingen, daar die politiek overigens meebrengt zich van bekeeringen te onthouden.

En wat het belang is van het vorstenhuis is ook het belang van de meerderheid der Maleiers van Boenoet; ook zij kunnen niet wenschen, dat de Dajaks van Oeloe-Kapoeas den Islam omhelzen en dus op het

punt van geloof met hen komen gelijk te staan, want zij doen zaken met die Dajaks, drijven met hen handel, koopen en ruilen boschproducten en rijst en al deze transacties zijn voor den Maleier veel voordeeliger, wanneer de Dajak Dajak blijft dan wanneer hij Moehamedaan is en zich ook Maleier noemt.

Natuurlijk sluit de politiek van vorst en volk niet uit, dat enkele Maleiers van Boenoet Dajaks rondom zich verzamelen ten einde hen in den waren godsdienst te onderrichten. Zij, die zoo vroom zijn, weten dat dit godsdienstonderwijs niet onbelangrijke voordeelen afwerpt; het gaat toch gepaard met exploitatie der discipelen en geschiedt het dan ook minstens met de bijbedoeling, zóódoende aan goedkoope werkkrachten te komen.

Ik heb getracht duidelijk te maken, dat het belang van Boenoet meebrengt om de Dajaks van Oeloe-Kapoeas onbeheerd te laten en dat direct ook wenig gedaan wordt ten gunste van dit Allah zoo welgevallig werk. Dit belet niet dat indirect, en in strijd met Boenoet's belang, toch veel geschiedt ter bevordering van die bekeering, want elke aanraking van Dajaks met Maleiers werkt haar in de hand.

Eerstens gebeurt dit in de geïsoleerde gevallen van bekeering, welke boven genoemd werden, omdat de omgeving van elken bekeerling met het denkbeeld van bekeeren vertrouwd raakt en elke bekeering aanstekend werkt.

Tweedens is elke Maleier, die met Dajaks omgang heeft en speciaal ter zake van handel drijven de Dajaksche kampongs bezoekt, in meerdere of mindere mate een colporteur voor zijn geloof, omdat hij, al is het ook stilzwijgend, door zijn voorbeeld, door zijne manieren, door geheel zijn doen en laten, doet denken hooger te staan en door zijn handelsgeest eene benijdenswaardige meerderheid toont.

Vooral nu de Dajak zelf minder reden heeft om aan zijn oud geloof gehecht te zijn en daardoor reeds eenigermate naar het Moehamedanisme overhelt, heeft de Islam dubbele kans vorderingen te maken.

Gelukkig nog maar (of ongelukkig, dit hangt af van het standpunt, waarop men zich plaatst) heeft de Dajak veel dat hij ongaarne loslaat en hij toch bij omhelzen van den Islam moet prijsgeven; hiertoe moet gerekend worden zijn varkensvleesch en zijn arak; op beiden is hij erg gesteld, al zijn er ook stammen, zooals de Kajans van de Oeloe-Kapoeas, die, evenals de Dajaks van Oeloe-Koetei en Oeloe-Mahakam, geen sterken drank gebruiken.

Ook zal de vrije verhouding tusschen ongehuwden, die den Moehamedanen een gruwel is (al profiteeren zij er gaarne van), menig wanke-

lend gemoed nog langer doen aarzelen dan anders het geval zou zijn. Dat echter de, als ik haar zoo noemen mag, indirecte propagands voor den Islam op den duur voor het Moehamedaansche geloof vruchten zal afwerpen, meen ik als zeker te mogen aannemen en daarop baseerde ik boven ook mijn twijfel omtrent de resultaten van ons streven om de Dajaks van Oeloe-Kapoeas buiten Moehamedaanschen invloed te houden. Het is ook de vraag of het verstandig is zulks te doen; want het Moehamedanisme staat in allen gevalle veel hooger dan het Dajaksche geloo en de Dajak, den Islam aannemende, doet daardoor ontegenzeggelijk een schrede vóóruit op den weg der ontwikkeling, waaraan geen volk ter wereld zich kan onttrekken.

Bovendien wij hebben in ons Indie zóó vele millioenen Moehamedaansche onderdanen en de overgroote meerderheid onder hen gedraagt zich zóó voorbeeldig, is zóó rustig en ordelijk, toont zóó weinig geneigdheid tot verzet, dat het waarlijk onbillijk is voor een nietig aantal Dajaks eene bijzondere bezorgdheid aan den dag te leggen.

Is die tegenwerking van het Moehamedanisme in de Oeloe-Kapoeas het gevolg van exceptioneele bezorgdheid voor de gemoedsrust der daar wonende Dajaks, dan is zij zeker niet gemotiveerd, want geen leer verzekert die gemoedsrust meer dan de Islam.

Ik moet hier nog bijvoegen dat, volgens een onlangs ontvangen bericht, toestemming gevraagd is tot de vestiging eener Roomsch-Katholieke missie te Smitouw; misschien is die toestemming nu reeds gegeven.

Keeren wij, na deze uitweiding, tot het straks genoemde Taman-hoofd Raden Mas terug. Hij bewoont te Poetoes-Sibouw een Dajaksch huis, waarvan de bewoners het grootste contingent leveren tot het zielental van dat plaatsje, hetwelk in 1888 slechts 187 bedroeg.

De bevolking om Poetoes-Sibouw heen en van welke dit gezegd kan worden het centrum te zijn, behoort tot twee Dajaksche stammen: de Tamans en de Kajans; men maakt nog weer onderscheid in de onderdeelen van deze stammen en heet die dan naar de woonplaatsen, maar de twee genoemde kunnen als hoofdstammen worden aangemerkt.

Poetoes-Sibouw ligt, zooals gezegd werd, bij de uitmonding der Sibouw-rivier. Wij voeren deze in 1888 per roeivaartuig op, waardoor wij 6 uur noodig hadden om de eenige kampong, ook Sibouw geheeten, te bereiken Zij bestaat uit vier huizen, bewoond door 278 Taman-Dajaks.

Er was bij onze komst juist sprake, dat een gedeelte der bevolking eenige uren hooger op een nieuwe kampong wilde stichten. Men gaf als reden hiervoor op, dat men geen goeden grond voor de rijstvelden meer in de nabijheid had. Daar dit motief niet aangenomen konde worden om reden dat dan de meerderheid niet had willen blijven en het verhuizen, vooral het verdeelen, der kampongs zooveel mogelijk moet worden tegengegaan, werd de verhuizing verboden, waarmee de betrokkenen ook gereedelijk genoegen namen.

De Sibouw-rivier is, zelfs bij hoog water, niet voor stoombarkassen bevaarbaar. Er staat een geweldige stroom en het water is op vele plaatsen met boomstammen versperd; het afvaren was dan ook niet zonder gevaar.

De Sibouw-rivier loopt ver door; zij is een der wegen door de Batang-Loepar-Dajaks van Batang Redjang (Serawak) gevolgd om in de Oeloe-Kapoeas door te dringen.

Alvorens de andere Taman-vestigingen, aan de Kapoes boven Poetoes-Sibouw gelegen, te bezoeken, gingen wij naar de Kajan-Dajaks aan de Mendalam-rivier, waarvan de uitmonding in de Kapoeas, van Poetoes-Sibouw uit, stoomende in een groot half uur te bereiken is. De Mendalam is wel niet breed maar diep, zooals de naam (dalam = diep) ook aanduidt en zij kan daarom nog een goed eind worden opgestoomd, zooals wij bij gemiddelden waterstand anderhalf uur deden; van dáár hadden wij nog een uur te roeien tot de groote kampong Tandjoeng-Karang.

Beneden deze kampong, ½ uur stoomens boven de monding der Mendalam, valt in deze rivier haar rechter zijtak de Samboes, aan wier oevers, een paar dagreizen hoogerop, de Boekat-Dajaks, een gevreesde rondzwervende stam, zich ophouden. Het bestuur is nog nimmer met hen in aanraking geweest.

Tandjoeng-Karong bestaat voornamelijk uit ééne groote woning, naar den bekenden Dajakschen bouwtrant opgebouwd en in 92 kamers verdeeld, door evenzooveel huisgezinnen betrokken. Het huis is op den rechteroever der Mendalam gelegen en had in 1888 eene bevolking van 559 Kajan-Dajaks. Op den linkeroever staat, tegenover de groote woning der Kajans, een klein huis van Taman-Dajaks met 3 kamers en 15 bewoners.

Anderhalf uur roeiens boven Tandjoeng-Karang ligt de kampong Pagoeng, bestaande uit 4 huizen met 70 kamers en 440 bewoners, ook meerendeels van den Kajan-stam.

De Kajans van de Mendalam behooren tot denzelfden grooten stam van dien naam, welken men noordelijk van de Batang-Redjang aan de Baram aantreft en waarvan wij een ander deel reeds aan de Mahakam boven de Kapala-Kiham hebben aangetroffen.

Zij werden reeds o. a. in het werk "Borneo's Westerassdeeling" van Veth besproken. Daar zij bovendien veel overeenkomst hebben met de Bahan's en Modangs, in Koetei ten noorden van de Mahakam woonachtig, waarvan door Von Dewall en mij reeds een en ander werd meegedeeld, acht ik het onnoodig hier van hen nog iets anders te zeggen dan dat zij zich steeds hebben doen kennen als flinke, gewillige menschen, op wie het bestuur ten allen tijde staat konde maken; aan koppesnellen doen zij niet meer.

Na een bezoek gebracht te hebben aan Tandjoeng-Karang en Pagoeng voeren wij de Mendalam af om verder de Kapoeas op te gaan. Wij hadden willen beproeven per stoombarkas op te varen, maar wij konden geen loods krijgen; niemand durfde als zoodanig te fungeeren; later bleek ons, dat men hierin groot gelijk had. Boven de monding der Mendalam toch is een groote bank in de Kapoeas; bij den lagen waterstand was deze droog en werd het water der groote rivier door eene nauwe opening geperst, waar nu zóó'n sterke stroom stond, dat de barkas hierin niet vooruit konde komen. Wij besloten dus de reis per roeivaartuig te vervolgen, hetgeen gelukte, nadat wij de vaartuigen met groote moeite langs den kant tot boven de bank hadden opgetrokken.

Ik wensch hier aan te teekenen, dat de waterstand boven Poetoes-Sibouw aan plotselinge dalingen en rijzingen onderhevig is; wij bemerkten dit onder anderen tijdens ons verblijf in de Mendalam; dit was trouwens een tijdsbestek van eenige dagen, maar men heeft het dikwijls, dat in weinige uren een hoogteverschil van eenige meters ontstaat.

Hieruit en uit het feit, dat het water, hetwelk wij als regen in de noordoostelijke richting van den oorsprong der Kapoeas zagen vallen, binnen een etmaal te Poetoes-Sibouw kwam opzetten, trokken wij het besluit, dat die oorsprong niet heel ver kan zijn. Berichten van inlanders
bevestigen ook die conclusie; wel zeggen zij daarbij, dat men een 20 à 30
dagen noodig heeft om het eindpunt, dat gelegen is ten Zuiden van de
Batoe-Tibang, te bereiken, maar dit weerspreekt onze veronderstelling
niet, want de afstanden, opvarende, per dag af te leggen, kunnen niet
dan zeer luttel zijn.

Te Poetoes-Sibouw heest men nog maar weinig hoogte boven de zee bereikt. De oevers van de breede Kapoeas zijn tot dáár en nog verderop bijna geheel gelijk, dat is laag en vlak; voor verreweg het grootste gedeelte worden zij bij hoog water overstroomd; slechts hier en daar zijn plekken altijd droge grond, terwijl hooge terreinen, ook heuvels en heuvelrijen, nu en dan van beneden af, zelfs op korten afstand van de zivier, voorkomen.

Bij niet te laag water is de Kapoeas gemakkelijk bevaarbaar voor stoomscheepjes van 6 voet diepgang, tot de Mendalam toe; bij laag water, hetgeen elk jaar van één tot vier maanden voorkomt, is de vaart, wegens steenen en ondiepten, alleen mogelijk voor prauwen; deze hebben echter nimmer groote moeite zóó ver op te komen; zelfs verder op, waar nog Tamans wonen, wordt het water niet bepaald gevaarlijk, hoewel hier eilandjes, welke men beneden Poetoes-Sibouw niet heeft, tot meerdere krachtsinspanning en omzichtigheid dwingen, wegens den sterken stroom, dien men langs de zijden heeft.

In dit opzicht is er een groot verschil tusschen de Mahakam en de Kapoeas, want de eerstgenoemde wordt reeds bij Djoehalang, ruim 250 Engelsche mijl de rivier op, moeielijk bevaarbaar, terwijl de laatste dit eerst wordt bij de Mendalam, circa 400 Eng. mijlen. Het verschil in bevaarbaarheid tusschen Kapoeas en Mahakam is oorzaak, dat men aan beide rivieren verschillende toestanden vindt. De Dajaksche bewoners der binnenlanden toch houden niet van goed bevaarbare wateren; zij verkiezen andere met versperringen en stroomversnellingen, waar zij met hunne waardelooze "boengs" langer de baas kunnen zijn en waar beschaving en vreemde overheersching meer moeite hebben door te dringen; al rukken deze vijanden daar ook vóóruit, zonder dat dit geheel te beletten is, de af te leggen weg is er moeielijker en de vorderingen zijn er langzamer.

Terwijl de Dajaksche vestigingen aan de Mahakam dan ook reeds kort boven Melak beginnen, vindt men die aan de Kapoeas (eene enkele uitgezonderd) niet beneden de monding der Mendalam.

En de bewoners hier boven, de Tamans, zijn nog wel halfbeschaafde Dajaks, terwijl hunne reisgenooten ginds, de Bahau's, veel primitiever zijn.

Men ziet dit dadelijk als men de kampongs nadert. De Taman-Dajak zal ons tegemoet komen gekleed met Chineesche broek, Maleisch buis en hoofddoek van Europeesch fabrikaat; geen kapmes of wapen op zij; de Bahau echter wacht ons op met het pantervel over de schouders, de krijgsmuts op het hoofd, de schaamgordel om de lendenen, de mandau om den middel. Vraagt men beiden of zij nog snellen, zoo zal de eerste antwoorden: "dat doen wij reeds lang niet meer", en de laatste: "als het mag, liever vandaag dan morgen."

Wellicht is ook in vroeger tijden de meerdere bevaarbaarheid der Ka-

poeas van grooten invloed geweest op het lot der Dajaks; ik kom hieropaanstonds terug.

Wij bereikten, roeiende, van af de monding der Mendalam, in één um de kampong Soewei, anderhalf uur later Melapi, drie en een half um daarna Koetambei, na nog anderhalf uur Sioet en vier uur later Loens. In de laatste van deze vijf Taman-kampongs wonen ook eenige Perhing ¹ Pajaks uit Oeloe-Koetei.

De huizen der Taman-Dajaks zijn, evenals die der Kajans, hoog uit der grond gebouwd, maar zien er meerendeels veel slechter en nog vuiler uit; wij vonden in de kamers echter vrijwat waarde aan koperwerk. De huizen waren omringd met aanplantingen van vruchtboomen; een eind beneden de kampongs waren de begraafplaatsen, waar de doodkisten boven den grond stonden, versierd met vlaggen en gekleurde katoenen stoffen. De Tamans geven aan hunne dooden de beste kleeren in de kist mede; aan de ongehuwden bovendien al hunne sieraden. Zoolang het lijk nog niet gekist is, wordt aan hetzelve eten voorgezet. Gedurende dien tijd, en ook nog daarna, moeten de achterblijvende betrekkingen vasten, dat thans nog alleen hierop neerkomt, dat geen muziek gemaakt mag worden, noch sieraden gedragen; vroeger onthield men zich ook van het eten van rijst en van andere dingen.

Bij het kisten van het lijk moeten de naastbestaanden hun haar scheren, dat bewaard wordt tot het einde van den rouwtijd; dan werpt men het in de rivier.

De vrouwen der Taman-Dajaks dragen de korte, nauwe sarong, die de meeste Dajak-vrouwen der Westerassdeeling gebruiken; zij onderscheiden zich daardoor van de Kajan-vrouwen, die een lap om het benedenhis en de beenen hebben geslagen; een ander punt van onderscheid tusschen beide is, dat de Taman-vrouwen zich niet tatoueeren, de Kajan-vrouwen wel. Algemeen dragen de Taman-vrouwen als versierselen grook rood koperen ringen in de uitgestrekte oorlellen en buikbanden, bestaande uit zilveren muntstukjes, aan elkaar bevestigd.

Te Loensa zag ik feestkleedjes van Taman-vrouwen, kunstig en smaalvol met kralen en schelpjes versierd; wanneer zij daarmee uitgedoscht zijn, steken zij in hare hoofddoeken welriekende bladeren. Deze kleeding komt alleen bij groote feesten voor den dag, waar de mannen zich u goed doen aan arak, die zij — de vrouwen — ronddienen.

Vóór haar huwelijk zijn de jonge meisjes geheel vrij in haar omgang

¹⁾ In de Oeloe-Kapoeas Penihin-Dajaks genoemd.

met mannen, mits zorgende geen kinderen te krijgen. Het huwelijk heeft plaats zonder veel ceremoniën; daarbij wordt echter wel feest gevierd en bij die gelegenheid aan de feestvierenden van het huwelijk mededeeling gedaan, onder bekendstelling welke bruidschat (antaran) door den man aan de vrouw gegeven is. Wanneer het huwelijk naderhand ontbonden wordt wegens schuld van den echtgenoot, gaat deze "antaran" verloren; is daarbij de schuld aan de zijde der vrouw, dan moet voor deze "antaran" eene schadeloosstelling worden uitgekeerd.

Het shamanisme treedt bij de Taman's niet zoo in alles op den voorgrond als bij de Kajan's en aanverwante stammen. Zoo wordt bij hen de rouw beëindigd met het baden van een ouden schedel door oude menschen en niet door shamanen; bij den "padi-oogst" gaan dezen niet voor en het raadplegen van voorteekenen uit de lever van een varken geschiedt ook door oude menschen.

Ik zal mij tot deze enkele ethnographische bijzonderheden bepalen, doch wil er nog de aandacht op vestigen, dat de Tamans zich zelf uitsluitend als oorspronkelijke bewoners van de Oeloe-Kapoeas beschouwen; de zielen hunner afgestorvenen gaan ook naar de Boekit-Tilong, die in deze streek duidelijk te zien is. De Kajans zijn, volgens de Tamans, "Orang menoempang" (tijdelijk verblijf houdenden, niet-inheemsch) en hebben geen rechten op den grond.

Dat de Tamans de oorspronkelijke bewoners van de Oeloe-Kapoeas zijn, is wel mogelijk, maar dat zij het alleen zouden wezen, is, dunkt mij, niet aan te nemen. Al die volken toch, bij wie de Tilong eene rol in het geloof speelt, moeten wel eens in de nabijheid van dien berg gewoond hebben en dagelijks onder den indruk hebben verkeerd van dat reusachtige granietgevaarte, hetwelk nu eens in nevelen is gehuld dan weer zijn phantastische vormen scherp afteekent tegen de lucht; het is niet denkbaar, dat hun bakermat altijd de Oeloe-Kajan is geweest. Vóór hunne vestiging in dit moeielijk bereikbare land, waar de Tilong niet te zien is, hebben de voorouders vermoedelijk ook eens in de Oeloe-Kapoeas gewoond en zijn zij eerst later naar de Oeloe-Kajan verhuisd, misschien wel doordat zij verontrust werden door vreemdelingen, die gebruik maakten van de gemakkelijke bevaarbaarheid der Kapoeas.

Trouwens daar is nog een feit, oogenschijnlijk van geringe beteekenis, hetwelk doet veronderstellen, dat alle volken, afkomstig uit het land van Poh-Kedjin, eens gewoond hebben onder het bereik van handelaren. Bij hen allen vindt men de zoogenaamde Aggry-Perlen, oude kralen van aanzienlijke waarde. Deze Aggry-Perlen, die men aangetroffen heeft in de

Friesche terpen en in de Drentsche hunnebedden, in Centraal-Afrika en op de Pelouw-eilanden, zijn producten van een lang verloren gegane kunst; waar zij gemaakt zijn is niet bekend, misschien wel in Phoenicie, maar het lijdt bijna geen twijfel of zij zijn een handelsartikel geweest door ondernemende handelaren in vroegere eeuwen verspreid. Hadden de volken van de Oeloe-Kajan te voren niet ergens anders gewoond, b.v. aan de Oeloe-Kapoeas, dan waren zij zeker niet in het bezit gekomen van deze Aggry-Perlen.

Het land boven Loensa werd nog nimmer door een Europeaan bezocht en wij weten daarvan dan ook nog zeer weinig. Volgens de overeenkomstige berichten van verschillende inlanders staat het echter vast, dat door dit land de weg naar Oeloe-Koetei loopt. De in de Oeloe-Kapoeas gevestigde Penhing-Dajaks en verscheidene Kajans van dáár hebben allen dezen weg gemaakt en ook legde de inlandsche schrijver Hadji Achmat, van den Controleur van de Boven-Kapoeas, hem gedeeltelijk af.

Van dezen Hadji Achmat vernam ik het volgende: In zes dagen was hij van Loensa de Kapoeas opgevaren tot de monding van de linkerzijrivier Bongan; deze opvarende, was hij in drie dagen gekomen tot haar linkerzijtak de Boelet, welke hij ingeslagen had om na één dag Lijang-Boeboe te bereiken. Van hier was hij 's morgens te voet verder gegaan over heuvelachtig terrein en 's avonds aangekomen bij de Bongan-Dajaks, behoorende tot den stam der Penhings en het gezag erkennende van Kajaen Amoen Liroeng, twee Penhing-hoofden aan de Sepoetan. Van daar was het nog één dagreis over gelijk terrein tot de stamgenooten aan de Sepoetan, een zijtak van de Kaso, die eene groote rechter-zijrivier van de Mahakam is.

Hadji Achmat keerde van Lijang-Boeboe terug en drong zelf dus niet tot het stroomgebied van de Mahakam door; zijne mededeeling komt echter met die van anderen vrijwel overeen.

Hadji Achmat reisde alzoo van Loensa af tien dagen te water; hij trof echter hoog water; bij meer gunstige gelegenheden is dit traject waarschijnlijk eenige dagen korter. Overland heeft men twee dagreizen te besteden om van het eene stroomgebied in het andere te komen; men passeert hier, zooals gezegd werd, enkel heuvelachtig terrein. Dit bericht is van belang, omdat, als het waar is en daaraan valt, geloof ik, niet te twijfelen, daardoor het geloof aan een Centraal-gebergte van Borneo vrijwel aan het wankelen wordt gebracht. Trouwens een Centraal-gebergte van groote hoogte, zooals men op Java en Sumatra aantreft, zal wel in

geen geval in Borneo's Centrum te vinden zijn, want zelfs te Loensa is daarvan geen spoor te zien. Men heeft daar wel den meergenoemden Tilongberg en ook nog ander hoog terrein in de verte, maar nergens eenig gebergte van belang en bestond dit, dan moest het, dunkt mij, van Loensa uit te zien zijn.

Dat het stroomgebied van de Mahakam van dat der Kapoeas alleen door heuvelachtig terrein zou zijn gescheiden, is volstrekt niet onwaarschijnlijk, want van het stroomgebied der Melawi kan men eveneens in dat der Kahajan- en Ketingan-rivieren komen zonder bergketenen te passeeren; de Dajaks van de Melawi nemen zelfs hunne vaartuigjes mede, wanneer zij van het eene stroomgebied naar het andere gaan; zij slepen deze dan over eene korte uitgestrektheid over land.

Het was aan de Bongan-rivier, straks genoemd, dat de moord op Muller in 1825 plaats vond. Deze gebeurtenis is nog niet bij de inlandsche bevolking van Oeloe-Kapoeas in vergetelheid geraakt en zoo vernam de kontroleur van Boven-Kapoeas, Van Velthuysen, nog eenige bijzonderheden daaromtrent, die, als niet bekend zijnde, wel verdienen hier vermeld te worden.

Toen Muller met de 12 inlandsche soldaten, die hem vergezelden, de woonplaats der Penhing-Dajaks van de Sepoetan bereikt had, werd zijn verder geleide opgedragen aan de Penhings van die streek, die op zich namen hem veilig naar de Kapoeas te brengen. Binnen ons gebied aan de Boven-Bongan gekomen, brachten die Dajaks het plan om Muller te vermoorden, dat tevoren reeds was gemaakt maar nog steeds door de waakzaamheid van Muller's escorte was verijdeld, ten uitvoer, met den bekenden noodlottigen afloop.

Door list namelijk gelukte het aan die Dajaks om Muller en de zijnen weerloos te maken. Bij een der riam's (stroomversnellingen) toch werd door de Penhings aan Muller de raad gegeven om de geweren vast te binden, daar anders kans bestond dat deze door hoogen golfslag over boord sloegen. Naar dien raad werd geluisterd en de geweren werden vastgebonden. In de riam gekomen deden de Dajaks de prauw omslaan, waarna zij Muller en de fuseliers aanvielen en afmaakten; slechts aan enkelen dier militairen gelukte het in het bosch te ontsnappen; drie hunner bereikten Poetoes-Sibouw.

De Penhing-Dajaks, die 65 jaar geleden den moord gepleegd hebben, zijn van denzelfden stam als die, welke nu nog in de Sepoetan woont.

Aan deze geschiedenis knoopt zich nog de legende vast, dat de romp van het lijk van Muller de rivier niet afdreef maar op de plek, waar hij vermoord werd, bleef ronddrijven en niet tot ontbinding overging. De Penhing-Dajak, die het hoofd had buit gemaakt, kreeg kort na den moord een kwaden droom; hij droomde dat hem en zijnen huisgenooten een groot ongeluk overkomen zou, indien het hoofd niet bij den romp werd teruggebracht. Toen hij ontwaakte bracht hij het hoofd onmiddellijk bij den romp, waarna het lijk van Muller pas de rivier afdreef en nimmer meer gezien is geworden.

De geweren der soldaten zijn door de Penhing's opgevischt geworden en moeten nu nog in de huizen van Amoen Liroeng en Kaja aanwezig zijn. —

Thans ten slotte nog teruggekomen op de vraag: "Hoe kunnen wij invloed krijgen in Oeloe-Koetei, als het land van Beneden-Koetei 200 moeielijk te naderen is?" —

Wij hebben gezien, dat de weg van Poetoes-Sibouw naar Oeloe-Koetei lang en moeielijk is, misschien niet eens veel beter dan die, welke van de Oeloe-Mahakam derwaarts voert; maar Poetoes-Sibouw is een punt, dat per stoomer te bereiken is, waar ons direct gezag gevestigd is en waar wij ons van lieverlede meer en meer met de zaken moeten inlaten.

De moeielijkheden op het traject boven Loensa zijn ook van anderen aard dan die boven Longglat; immers een Kapala-Kiham vindt men er niet. Daar staat wel tegenover, dat men hier zwervende Poenans aantreft en het is zeker niet te ontkennen, dat de aanwezigheid van deze Dajaks, die onzichtbaar en straffeloos met hunne blaaspijpen en vergiftigde pijltjes doodelijke wonden weten toe te brengen, een ontzachlijk groot gevaar daarstelt, doch Poenans zijn ook menschen en wel armoedige menschen met behoeften, zoowel aan lijnwaden als aan de bij hen zoo geliefkoosde tabak; daarom is het niet aan te nemen, dat wij met hen niet op een goeden voet zouden kunnen komen. Trouwens inlanders, die hen kennen en dikwerf omgang met hen hadden, verzekeren ook dat dit niet onmogelijk is.

In die richting moet althans gestreefd worden zelfs onverschillig of men daarbij al dan niet het oog heeft op de Oeloe-Koetei, want die Poenans van de Bongan, welke waarschijnlijk dezelfde zijn als die van de Kaso en van de Mandei, ten minste tot denzelfden stam of familie behooren, zijn de schrik van de Melawi en andere streken; menigmaal toch werden daar door hen aankomende jongens en meisjes geroofd om die elders te verkoopen. Men beweert, dat dit in de laatste jaren niet meer geschiedt en ik wil het gelooven, doch het staat vast, dat het gevaar voor misdrijven der Poenans alleen dan voorgoed verdwijnt, wanneer wij met dezen

betrekkingen aanknoopen en onderhouden en hen terugbrengen van een zwervend leven.

Daarnaar moeten wij streven.

En dreigt van de zijde der Poenans geen gevaar meer dan is de lange weg van Loensa naar Oeloe-Koetei geen overwegend bezwaar meer voor het zoeken van aanraking met de tegen de grenzen van Serawak wonende Penhings.

Aanleiding daartoe bestaat bijna altijd of is anders gemakkelijk te vinden en het middel daartoe hebben wij in de Penhings, te Loensa gevestigd, en in de Kajans van de Mendalam, die, zooals reeds gezegd werd, met de stammen van Oeloe-Koetei bevriend zijn. Het mag inderdaad een geluk gerekend worden dat wij te Poetoes-Sibouw de beschikking hebben over een stam zóó flink, zóó gewillig en zóó vertrouwbaar als die Kajans; het zou te betreuren wezen als wij van dit voordeel geen partij trokken.

Of het mogelijk zal zijn invloed in Oeloe-Koetei te krijgen is eene vraag, die natuurlijk vooraf niet te beantwoorden is. Met politieke onderhandelingen wordt een oogenschijnlijk gemakkelijk te bereiken resultaat soms in 't geheel niet of wel zeer moeielijk verkregen, daarentegen een niet te verwachten succes dikwerf spoedig. Onze politiek tegenover Oeloe-Koetei kan zoowel mee — als tegenvallen. Doch wat ook het einde moge zijn, laat men tenminste beginnen met iets in deze richting te doen en, eens begonnen, ook volharden zonder dat private inzichten van bestuurshoofden van invloed zijn op hetgeen de gedragslijn van het bestuur behoort te wezen.

Laat bovenal op den voorgrond staan, dat het onze ernstige wil is onze stem te doen hooren en eerbiedigen in de streken, die wij binnen onze grenzen getrokken hebben, en dat wij krachtig en machtig genoeg zijn om ons gezag niet alleen in schijn maar ook in werkelijkheid te doen erkennen.

DE WATERSTAATSKAART VAN NEDERLAND.

VOORDRACHT

GEHOUDEN IN DE

60e ALGEMEENE VERGADERING

VAB HET

KONINKLIJK NEDERLANDSCH AARDRIJKSKUNDIG GENOOTSCHAP

DOOR

P. A. VAN BUUREN

Kapitein der Infanterie.

Met een Kaartje.

Onder de cartografische werken van Nederland bekleedt de Waterstaatskaart eene belangrijke plaats en verdient ten volle eene bespreking in een' kring van belangstellenden. Meermalen meenden wij op te merken dat die kaart in hare inrichting en beteekenis bij het beschaafd publiek niet algemeen bekend is, en wij stelden ons voor dat het nuttig kon zijn de aandacht van niet speciaal deskundigen op dit werk te vestigen.

Bij de mondelinge voordracht waren in de vergaderzaal een aantal wa terstaatskaarten aanwezig, benevens eenige ruwe, groote schetsen, waarop gemakkelijker dan op de kaarten zelf, de hoofdbeginselen konden worden aangewezen en verklaard.

Om nu bij een schriftelijk verslag toch verstaanbaar te zijn, waren wij genoodzaakt een kaartje daaraan toe te voegen, bewerkt in den geest der Waterstaatskaart; wij kozen daartoe een denkbeeldig terrein, omdat men zelden in een zóó klein bestek als dit kaartje aanbiedt, de verschillende typen van terreinen, n.l. hooge gronden, veenderijen en polderland zal aantreffen; de wensch om de drukkosten niet noodeloos op te drijven, deed ons dus besluiten op een kleine ruimte allerlei zaken bijeen te brengen, die men in de werkelijkheid slechts op meerdere bladen der kaart zou kunnen vinden.

Voor meer gezette studie der kaart moeten wij echter aanbevelen de

kaarten zelve ter hand te nemen. Zij zijn in den handel verkrijgbaar bij Gebroeders van Cleeff te 's Gravenhage, tegen den prijs van f 1,50 per blad. Het is niet overal gemakkelijk eenige bladen der kaart in bruikleen te verkrijgen; particulieren zijn zelden in het bezit daarvan. De bureaux van Rijks- en Provincialen Waterstaat, waar de kaart aanwezig is, zijn niet verplicht exemplaren daarvan uit te leenen; echter ontbreekt het bij dien tak van dienst niet aan welwillendheid om enkele bladen aan belangstellenden voor eenigen tijd af te staan, zooals wij zelve meermalen mochten ondervinden. Aan inrichtingen van Middelbaar Onderwijs zou onzes inziens de aanwezigheid van eenige bladen wel gewenscht zijn, vooral van de omliggende streek, zoodat men de studie der kaart met aanschouwing op het terrein kon doen gepaard gaan.

Het doel der kaart is om voor elk terreingedeelte nauwkeurig te kunnen nagaan waarheen het overtollige polderwater wordt afgevoerd en uit welke wateren c. q. de polders bij watergebrek kunnen inlaten; verder om duidelijk aan te geven hoe de verschillende wateren van ons land met elkander in verband staan en in het algemeen een juist denkbeeld te geven van den hydrografischen toestand van onzen bodem. Voor de studie van eventueel te stellen militaire inundatien, is de waterstaatskaart een onmisbaar hulpmiddel.

Als grondslag heeft gediend een overdruk van de bekende "Topografische en Militaire Kaart van het Koninkrijk der Nederlanden op de schaal van 1:50,000", in de wandeling "Stafkaart" genoemd, omtrent welker inrichting o. a. gegevens zijn te vinden in het Tijdschrift van dit Genootschap, A° 1886.

De bladen dezer kaart zijn lang 80, hoog 50 centimeter, zoodat de lengte en hoogte stukken van 40,000 en 25,000 M. voorstellen. Voor de bladen der Waterstaatskaart heeft men elk blad over de lengte en de breedte in tweeën verdeeld, zoodat één blad W.S.K. langs de randen gemeten, 20,000 en 12,500 M. bevat. De bladen der W.S.K. behouden den naam dien zij als Stafkaart hadden, maar de vier kwartieren zijn van een nummer voorzien, zoodat door naam en nummer het aan te duiden blad volkomen bepaald is, aldus:

1	2	Groningen.
3	4	dromingen.
1	2	Assen.
8	4	Assen.

De kleur van den bedoelden overdruk is niet voor alle Waterstaatskaarten volkomen gelijk 1). Op vele bladen zijn de lijnen van den onderdruk eenigszins roodachtig, hetgeen soms den schijn geeft of de kaart rood getint is. Waar in het vervolg sprake zal zijn van gekleurde deelen der kaart worden altijd bedoeld de vlakke tinten van verschillende kleur, die over den onderdruk heen gelegd zijn, niet de gekleurde lijnen van dea onderdruk zelf.

Om de eigenlijke kaart bevindt zich eene randbeschrijving, die met de kaart één geheel uitmaakt en waarop tal van waterstaatkundige gegevens zijn vermeld, die op het blad betrekking hebben. De bijgevoegde schets geeft daarvan een denkbeeld; de inhoud van de randbeschrijving zal later worden besproken.

A. VOORSTELLING VAN VERSCHILLENDE WATEREN.

Als eerste onderscheiding vindt men op de kaart aangeduid het verschil tusschen binnen- en buitenwater.

De zee en alle vrij afstroomende rivieren, dus al het water dat men niet door sluizen in bedwang kan houden, is op de W. S. K. niet gekleurd. (Zie op de schets de rivier de Elster).

De wateren daarentegen waarvan men den stand tot zekere hoogte door sluizen kan beheerschen (binnenwater) zijn op de kaart door eene forsch gekleurde lijn aangeduid; in het algemeen verandert die kleur (66k bij wateren die in hun geheelen loop denzelfden naam dragen) tekens als het gemiddelde peil van het water afwisselt, d. i. dus bij sluizen. Zoo ziet men b. v. op de W. S. K. de Oude Rijn van Utrecht tot Leiden eenige malen van kleur wisselen. Van Utrecht tot den Stadsdam is het water bruin gekleurd, van den Stadsdam tot den Heldam geel, van den Heldam tot Harmelen blauw, van Harmelen tot Bodegraven roodachtig, eindelijk van dit laatste punt tot Katwijk groen. Elk der verschillende gekleurde vakken stelt een afzonderlijk pand met een eigen peil voor.

Op bijgaande schets ziet men het Mussel Kanaal, bij het punt C. van kleur veranderen. Raadpleegt men daarbij de randbeschrijving, dan ziet men onder het opschrift "Kanalen" dat het bovenste pand een ondersteld gemiddeld peil heeft van + 2,50, het benedenste punt van + 1,20.

In het algemeen geldt dus het beginsel dat alle wateren die door

De bedoelde overdruk wordt ook wel zonderdruk" genoemd, omdat de daarop aanwezige lijnen op de kaart nanwezig zijn vóór het aanbrengen der kleuren, en derhalve onder de kleuren liggen.

hunne opene gemeenschap gelijk peil hebben, dezelfde kleur dragen; een dergelijk samenstel van in open gemeenschap liggende wateren draagt den naam van boezem.

Op de schets zijn als boezems te onderscheiden:

Het Veenkanaal met zijne zijtakken - licht rood

De Geskes-Vaart --- groen

Het Mussel Kanaal (bovenpand) met het Oosterdiep en eenige daarop uitloopende weteringen — blauw

Het Mussel Kanaal (benedenpand) met het Westerdiep - paarsch

De Heicop met talrijke vertakkingen - oranje

De Tjamme met eenige plassen (20) 1) — carmijn.

Om zich een geheel juist beeld te vormen van de peilverwisseling onzer wateren, moet men ook de randbeschrijving raadplegen, daar de kaart alleen hier niet alle bijzonderheden kan oplossen.

Als voorbeeld daarvan kan o. a. dienen het Winschoterdiep van Groningen naar de Pekelaa. Op de W. S. K. vindt men dit Kanaal als verdeeld in drie panden, zoodat men door sluizen het water in elk pand kan ophouden. De randbeschrijving vermeldt echter dat het peil der drie panden is Winschoterpeil n. l. o.81 + A. P. zoodat in den regel de sluizen open zullen staan, en het Kanaal feitelijk slechts één pand vormt. Alleen gedurende den afvoer van hoog water uit de veenen in het Z.O. der provincie Groningen worden de drie panden van elkander gescheiden gehouden.

Meestal geeft de kaart de normale toestanden aan en moeten uitzonderingsgevallen of bijzonderheden in het randschrift worden gezocht.

Bij elke peilverwisseling op een kanaal behoort natuurlijk eene sluis. Op de kaart zal men bij elke sluis eene letter vinden, verwijzende naar eene letter in den linkerbovenhoek der randbeschrijving, waar men dan omtrent bijzonderheden der sluis gegevens vindt b. v. wijdte, diepte van slagdorpel en lengte der schutkolk, benevens de bestemming der sluis. Dient zij alleen om hooger water te keeren, zooals C op de schets, dan zijn de puntdeuren naar het hoogste water gekeerd. Kunnen de wateren, die de sluis scheidt, ten opzichte van elkander van peil wisselen, dan moeten de puntdeuren naar weerszijden keeren en zijn dus in dubbelen getale aanwezig. In dit geval verkeeren o. a. alle sluizen die gemeenschap met het buitenwater daarstellen; zij moeten hooge vloeden kunnen keeren, maar ook het binnenwater kunnen ophouden.

De tusschen haakjes geplaatste cijfers hebben betrekking op de schets waarop de namen van verschillende deelen gemakshalve door een nummer vervangen zijn.

B. STROOMEND WATER.

Voor zooverre stroomend water niet tot het buitenwater behoort kan men drie gevallen onderscheiden:

- a. Een riviertje of waterloopje mondt op het buitenwater uit, maar is daarvan door eene sluis gescheiden, zoodat men de afstrooming in zijne macht heeft. Men treft dit o. a. aan bij de Westerwoldsche Aa en de Linge. Deze wateren bekomen op de W. S. K. eene eigene kleur met eene sluis aan het uiteinde. Op de schets is de Hunse in dit geval ondersteld.
- b. Een riviertje watert af op een kanaal, maar kan daarvan door een sluis gescheiden worden gehouden, zoodat de uitwatering niet vrij is. Ook deze wateren hebben eene eigene kleur, daar zij wanneer de sluis gesloten is werkelijk een op zichzelf staand gebied vormen. Zie de At op de schets.
- c. Een waterloop mondt vrij uit in een kanaal en zal dus het pel daarvan bij sterken watertoevoer verhoogen. De waterloop heeft dan de kleur van het kanaalpand waarop de waterafvoer plaats heeft; als voorbeeld daarvan is de Sijpsloot op de schets aangegeven. In de werkelijkheid bevindt zich o. a. het Drentsche Diep of Oostermoersche Vaart in dit geval, daar deze zich geheel vrij in het benedenpand van het Winschoterdiep stort. Het is duideiijk dat men zich in dat geval wachten moet voor de meening dat het beginsel "gelijke kleur is gelijk peil" hier letterlijk doorgaat. De Oostermoersche Vaart toch loopt door gronden die tot 7 M + A. P. gaan, en heeft in haren bovenloop peilen boven de 6 M. + A. P., terwijl zij uitmondt in een water welks peil + 0,81 M. is. Zij stroomt dus, en de gelijkheid van kleur wil alleen zeggen dat zij in open gemeenschap met het lager liggend water is.

Een bijzonder geval eener dergelijke vrije uitwatering van eene rivier in een kanaal vindt men op W. S. K. Blad Bourtange 2 waar zich de Mussel Aa vrij met het 6° pand van het Stadskanaal verbindt. Tegenover het punt van uitmonding ligt in den Noordelijken dijk van het kanaal een overlaat, die, zoodra het water boven zeker peil stijgt, begint over te loopen en het meerder aangevoerde water op de beneden 100p der Mussel Aa stort. Getrouw aan het beginsel heeft men aan het deel der Mussel Aa boven het kanaal en aan het kanaalpand dezelfde kleur gegeven, het rivierdeel beneden het kruisingspunt eene andere kleur.

In sommige hoogere streken o. a. in het N. O. van Overijsel en in het Z. van Limburg worden molens door het water van beken in beweging gebracht. Daartoe is in de beek zelf eene stuw (afsluiting) aangebracht, terwijl het water door afleiding langs een zijkanaaltje gedwongen wordt het molenrad te treffen en dit in beweging te brengen, waarna het dan weder in het bed der beek terugkeert. Vroeger heeft men op de W. S. K. het deel tusschen twee stuwen (molens) gelegen als een afzonderlijk pand beschouwd en geteekend, daar men door het vastzetten van het molenrad de afstrooming grootendeels kon beletten en dus werkelijk de beek in eenige panden met verschillend peil verdeeld was. Bij de jongste waterstaatsverkenningen in Limburg vond men op sommige beken zooveel molens staan, dat het ondoenlijk was bovenstaand beginsel te blijven volgen; men heeft daarom de stuwen der molens eenvoudig aangeduid, maar het geheele beekje tot aan de uitwatering ééne kleur gegeven 1).

C. POLDERS.

Het begrip dat men in het dagelijksch leven aan het woord *polder* hecht is niet scherp begrensd en verschilt veelal naar de opvatting van den persoon, die het bezigt.

De stedeling noemt vaak alles wat buiten de stad met slooten en tochten doorsneden is "polder". De heemraad, ingeland en polderlastplichtige strekt de beteekenis van het woord gewoonlijk uit tot aan de grens waarover zijn gezag, zijn belang en zijne belasting loopt. Beide opvattingen zijn niet in overeenstemming met het begrip dat de W.S.K. aan het woord "polder" hecht. De waterstaatkundig juiste bepaling — en als zoodanig ook door de W.S.K. aangenomen — zou moeten luiden: "Een polder is een stuk land door dijken of kaden van andere stukken land

¹⁾ Hoe nuttig de waterstaatsverkenningen ook voor verdere terreinkennis zijn, bleek bij de jongste verkenning in Limburg. Tot nog toe meende men in den Krikelenberg bij Wylré het hoogste punt van ons land te vinden; op de Stafkaart vond men dit punt, met nóg een nabijliggend punt gemerkt als 280 + A. P. Nu is gebleken dat één dezer punten + 190, het andere + 280 ligt. Het werkelijk hoogste punt schijnt nu te zijn + 320 M., gelegen even ten Oosten van Vaals, vlak aan maar nog binnen de Limburgsche grens. De Stafkaart geeft op dit punt een hoogen top aan, maar ± 30 M. buiten de grens. De W. S. K. van het zuidelijkste deel van Limburg zal waarschijnlijk nog dit jaar gereed komen.

gescheiden, terwijl ook het water binnen den polder door duikers, sluiten of valschutten van aangrenzende wateren gescheiden wordt."

Uit die bepaling volgt dat men in een polder geen ander water hebben kan dan wat er als regenwater op valt en wat er opzettelijk wordt ingelaten. Wordt nu, door overmaat van regenval boven de verdamping, de waterstand in den polder te hoog, dan moet het overtollige water, door bemaling op een boezem, worden uitgeworpen.

Polders in laatstbedoelden zin zijn op de Waterstaatskaart voorgesteld en wel naar het volgend beginsel. Alle polders, die hun water op denzelfden boezem uitslaan, zijn door eene vlakke tint van dezelfde kleurals de boezem aangegeven, welke tinten voor verschillende polders in kracht verschillend zijn.

Op bijgaande schets ziet men dus terstond det de polders 6, 7, 8 en 12 (oranje getint) hun water loozen op den boezem van de Heicop, de polders 19, 23, 24 en 25 (rood) op de Tjamme enzv.

Legt men eenige bladen der waterstaatskaart aan elkander, b. v. de stukken waarop de terreinen voorkomen tusschen Haarlem, Gouda, Bodegraven en de duinenrij, dan zal men zien dat verreweg het grootste deel dezer terreinen de meer of minder donker getinte groene kleur vertoonen; zij wateren dus alle af op één boezem en wel op den grooten boezem van Rijnland. Aan de rechterzijde der randbeschrijving vindt men gekleurde blokjes met een romeinsch cijfer gemerkt, onder welk cijfer men eenige toelichtingen omtrent den aldus gekleurden boezem aantreft; beschouwing der kaart geeft dus reeds terstond een algemeen overzicht omtrent de afwatering der polders.

Het water binnen de polderkaden, dat dus niet met den boezem op en neergaat, heeft geen eigene kleur. De polderslooten zijn dus slechts door de zwarte lijnen van den onderdruk aangegeven en de tint van den polder ligt er over heen (zie b. v. de dunne zwarte lijnen in 15 en 16).

Somtijds hebben kleine gedeelten van polders nog gelegenheid door enkele valschutten of duikers hun water van het grootere deel afgescheiden te houden en vertoonen dus een' eigen waterstand; de Waterstaatskaart heeft in den regel met dezen toestand geen rekening gehouden; dergelijke kleine deelen zijn geteekend als tot den polder te behooren, en in de randbeschrijving is de juiste toestand vermeld.

De administratieve indeeling der polders, de vereeniging van een aantal polders tot waterschappen, heemraadschappen enzv. is in de randbeschrijving aangeduid; voor meer bijzonderheden omtrent détails verwijst dit gewoonlijk naar polderreglementen, overeenkom-

sten, concessiën en speciaal-beschrijvingen van het bedoelde gebied.

Volgens het beginsel zouden polders, rechtstreeks uitwaterende op de zee en de vrije rivieren geen kleur moeten hebben. Om ze echter terstond als polders te kunnen herkennen is voor alle bladen der kaart dezelfde kleur voor deze gronden aangenomen, n.l. het lichte groen, dat men op de schets in (1), (2) en (3) vindt.

Het kan voorkomen dat polders geheel afgescheiden liggen van den boezem waarop zij loozen moeten; die polder kan dus slechts uitwateren door eerst zijn water (des noods door bemaling) te brengen op een nevenliggenden polder, van waar het dan op den gemeenschappelijken boezem geloosd wordt. De W. S. K. duidt dit aan door den aldus afwaterenden polder dezelfde tint te geven als die waarop hij zijn water brengt, maar er eene donkere bies om te leggen. In de schets ziet men alzoo dat polder (16) zijn water brengt op (15), dat (22) eerst loost op (21) en dat van (15) en (21) rechtstreeksche afwatering op den boezem (benedenpand Mussel Kanaal) plaats heeft.

Niet zeldzaam is het geval dat een polder op twee of meer boezems afwatert en dus gebruik maakt van den boezem, die door oogenblikkelijken waterstand daartoe het meest geschikt is. Een dergelijke polder is op de W. S. K. voorgesteld door de kleuren der boezems als strepen over den polder te brengen. Polder (13) watert dus uit op het benedenpand van het Mussel Kanaal en op de Heicop. Polders (4) en (5) loozen op laatstbedoelden en op het buitenwater.

Komt het voor dat polders eene dubbele uitwatering hebben, maar voor één dezer de tusschenkomst van een anderen polder noodig hebben, dan worden de pas genoemde strepen met de bies verbonden. Polder (14) b. v. watert rechtstreeks af op de Heicop (de oranjestreep is daarom niet gebiesd) maar werpt ook water op (16) hetgeen kenbaar is aan de bies om de paarsche streep in polder (14). Nog eene variatie op dit gebied wijst (27) aan. Hier duidt de geele streep met bies op afwatering naar de Heicop door bemiddeling van (26), terwijl de blauwe streep, eveneens met eene bies, te kennen geeft dat (27) ook voor zijne afwatering naar den blauwen boezem (Mussel Kanaal) de hulp van een anderen polder (29) noodig heeft.

Voor zooverre polders geheel voldoen aan de bepaling dat zij door dijken en kaden zijn omringd, kon omtrent de grens van den polder nooit twijfel bestaan. Wanneer zij echter aan een hunner grenzen tegen hoogere gronden aansluiten, die soms nog een deel van hun water op den polder afvoeren, kan onzekerheid bestaan omtrent de grens van het

poldergebied. Men heeft in dit geval het hoogere terrein, voor zoovere het op den polder afwatert, met eene bies van de kleur des polders omgeven, zoo noodig met bijschrijving. Zie (31) en (29).

Heeft de aswatering van polders niet altijd op dezelsde wijze plaats, zoodat die b. v. periodiek verandert, dan wordt de normale toestand geteekend, de buitengewone omschreven.

Enkele malen loopt een tak of wetering, tot eenigen boezem behoorende, dwars door het gebied van een anderen boezem, zonder dat die met de afwatering in eenig verband staat; een dergelijke, op zichzelf staande tak is dan terstond aan de kleur te herkennen, als niet tot het gebied van den omliggenden polder behoorende. Zie in (22) den tak van het Oosterdiep, blauw gekleurd. Het is duidelijk dat die tak dan door kaden omringd moet zijn, wanneer hij, zooals hier, door lager gelegen terrein loopt.

D. HOOGERE GRONDEN.

Hoogere gronden, d. i. terreinen die natuurlijk aswateren, zijn niet gekleurd. 1) Gewoonlijk vindt men in die gronden beken of waterloopen, die volgens het vroeger gezegde eene kleur hebben en waarop de omliggende terreinen afwateren. De grens der gebieden van deze beken is door eene bies aangeduid; waar men die grens op het terrein niet volkomen zeker, maar slechts hij benadering heeft kunnen vaststellen is de bies sfgebroken (zie op de schets het gebied der Ae). Op sommige bladen o. a. Assen 2 en Assen 4 vindt men twee biezen van gelijke kleur naast elkander, latende tusschen zich een wit streepje van omstreeks 1 millimeter. Dit kan dáár voorkomen waar die hoogere gronden afwateren op twee stroompjes, die zich ten slotte met elkaar verbinden of met hetzelfde water in open gemeenschap staan. Op de bedoelde bladen komen n. l. voor de Drentsche Aa (Hoornsche Diep) en het Drentsche Diep (Hunse of Oostermoersche Vaart). Zooals bekend is loopen beide vrij uit op het Winschoter Diep, bij en 6 K. M. ten O. van Groningen. Zij verkregen dus beide de kleur van dit Diep en de gronden tot hun gebied behoorende zijn met dezelfde kleur gebiesd; de terreinrug tusschen die gebieden is de eigenlijke waterscheiding.

¹⁾ Om misverstand te voorkomen wordt hier herinnerd aan het vroeger opgemerkte omtrent de kleur van den onderdruk. De min of meer roodschtige tint, die de kaart door de lijnen van den onderdruk schijnt te hebben, geldt niet als kleur. (Zie b. v. blad Assen 4).

Tot de hoogere ongekleurde gronden behooren ook de boezem- en lietlanden, die men langs sommige wateren aantreft en zonder bemaling uitwateren. Zie (11) en (17) op de schets. De grenzen dier boezemlanlen zijn met de overeenkomstige kleur gebiesd. Soms zijn die boezemanden vrij uitgestrekt. Zoo trekken, bij het beschouwen der bladen Grotingen 1 en 2, de aandacht twee groote uitgestrektheden ongekleurd gesied ten N. van het Damsterdiep en ten N. en O. van het afgesloten Reitdiep. Dit zijn boezemlanden van de boezems van Fivelingo en Huningo, voor het grootste deel natuurlijk loozende, dus niet in polders geegen. De hoogte dier gronden loopt van 0,50 tot 1,50 + A. P., het vater in de sloten staat van 0,30 tot 1,20 + A. P., terwijl de boezems van Fivelingo en Hunsingo respectievelijk peilen hebben van — 0,74 en — 0,64. Er is dus volkomen natuurlijke afwatering.

Duinterrein bleef almede ongekleurd; kanalen voor duinwaterleiding tomen daarop als boezems, gekleurd voor. (Zie bladen *Hillegom* en s Gravenhage).

E. VEENDERIJEN.

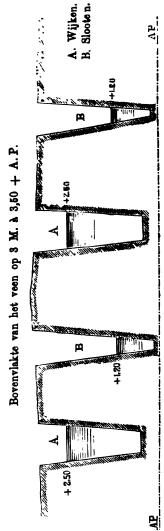
Veenderijen zooals zij in Groningen en Drenthe voorkomen, behooren ait den aard der zaak tot de hoogere gronden en zijn dus niet gekleurd. Die terreinen zijn door een groot aantal kanalen en vaarten doorsneden, n den regel met talrijke vertakkingen en dwarskanalen.

Wat de kleuren dezer veenkanalen betreft, heeft men het algemeen beginsel gehuldigd, dat gelijkgekleurde wateren gemeen, d.i. in open verpinding liggen en dus gelijk peil hebben. Men moet in deze streken schter onderscheid maken tusschen wijken (wieken zegt men in de veenstreek) en slooten.

Wijken zijn vaarten, hoofdzakelijk dienende om vaartuigen toegang te zeven tot de veenderij en de turf te vervoeren. Zij zijn alle bevaarbaar en liggen in open gemeenschap met andere bevaarbare kanalen en wateren. Slooten daarentegen zijn smaller en dienen gewoonlijk alleen tot afvoer van regenwater, dat zich als zakwater in de slooten verzamelt en langs deze naar lager gelegen wateren afvloeit.

Op de schets ziet men ten Z. van den spoorweg naar Almelo eene dergelijke veenstreek, door talrijke kanalen, wijken en slooten doorsneden. Daar de toestand hier soms vrij samengesteld is, moet men, om zich een juist beeld van de afwatering te vormen, nauwlettend acht geven op de kleuren der lijnen, de peilen der kanalen en de hier en daar geplaatste roode pijltjes.

Gaan wij het op de schets voorgesteld terrein eenigszins in bijzonde heden na, dan blijkt het volgende.



Westelijk van het Musselkanaal ligt het We terdiep, dat volgens de kleur gemeen ligt m het benedenpand van dit kanaal en dus e ondersteld peil heeft van + 1,20 (zie randbe schrijving onder het hoofd: Kanalen).

Gelijke kleur, dus ook gelijk peil daarmede hebben de paarsch gekleurde lijnen, die gebied (30) doorsnijden; dit zijn slooten, waz-langs het zakwater naar het Westerdiep af vloeit; de roode pijltjes geven hier aan dat de afwatering langs die slooten naar het Westen plaats heeft.

Het bovenpand van het Musselkanaal, pel ondersteld op +2.50, ligt daarentegen gemeen met de blauw gekleurde wijken, terwij het terrein is aangenomen op +3.50 à +3 M.

Het is dus duidelijk dat de slooten het zakwater zullen ontvangen, terwijl het veen van uit het bovenpand voor schepen toegankelijk is. Figuratief zou eene verticale doorsnedt over dit terrein loodrecht op de wijken en slooten er volgens nevensgaande schets uitzien.

Tusschen het Oosterdiep en het Musselkanaal ziet men nog eene smalle strook, paarsch gebiesd, waarmede wordt aangeduid dat ook die strook op het Westerdiep afwatert. Dit nu kan slechts geschieden door ondergrondsche gemeenschap, gemetselde, soms honten kokers, die het water onder het kanaal door, naar het westen voeren en zoo in gemeenschap brengen met de afvoerslooten naar het Westerdiep. Dergelijke ondergrondsche gemeenschapsgangen heeten grondduikers en

zijn door een teeken in rood (zie de verklaring in het randschrift) aan gegeven. In het Noorden noemt men die inrichtingen grondpomp, in waterstaatkundige werken vindt men soms de benaming syphon.

Het Oosterdiep, dat blijkbaar van deze streek geen water afvoert,

rordt daarentegen bezwaard met het polderwater van (29) dat door benalingswerktuigen zijn water op dezen boezem werpt, tevens medenenende het water van gebied (31) van de veenstreek (28), waar de wijken evens tot waterafvoer dienen, en c. q. van den polder (27) wanneer deze p (29) uitslaat.

De verder Oostwaarts liggende Geskes Vaart (ondersteld naar het N.O. nuiten de kaart af te wateren) ontvangt al het water uit de streek, die loor eene groene bies begrensd is, met uitzondering van een paar kleine polders (34). Volgt men nu de smalle groene lijnen binnen dit gebied, haarbij lettende op de pijltjes, die de richting van den waterloop aangeren, dan kan men den weg van het af te voeren water geregeld nagaan.

Het schijnt daarbij soms (zie 32 en 33) of het water tegen den draad n, d.i. naar hooger gelegen punten loopt, maar dit hangt alleen af van de hoogte van het water waarop de slooten ten slotte uitmonden. Men ziet herhaalde malen die slooten met grondduikers onder de wijken van het Veenkanaal doorgaan, om ten slotte uit te monden op de Geskes Vaart met een ondersteld peil van + 2 M., terwijl het Veenkanaal op een peil van + 3.50 is aangenomen. Tusschen (32) en (34) ligt een rug in het terrein, zoowel blijkbaar uit het peil + 4.2 als uit de tegengestelde richting van de pijltjes, die den weg van het water aangeven.

Dergelijke toestanden treft men in de veenstreek veel aan; door nauwkeurige beschouwing van de peilen in verband met de grondduikers en pijltjes vindt men altijd een bevredigende oplossing. De bestudeering der bladen Assen 2 en 4 is in dit opzicht zeer belangrijk 1), men zal daarop soortgelijke afwateringstoestanden aantreffen als hier zijn voorgesteld.

Soms vindt men ook, te midden van hoogere gronden, weder kleine polders, die rechtstreeks loozen op de wijk waaraan zij gelegen zijn; ook komt het voor dat tusschen twee gebieden, die op den eenen boezem afwateren, een stuk ligt, dat op een anderen boezem loost. (Zie o. a. bij 35).

F. BEMALING.

Ter aanduiding van bemalingswerktuigen zijn 4 verschillende teekens aangenomen, n. l. stoomgemaal, vijzelwatermolen, scheprad-watermolen en kleine of wipmolen. Bij het teeken voor stoomgemaal is met eene

¹⁾ Zie b.v. op Blad Assen 4 de afwatering van het Gasselter Nijeveen, gedeeltelijk met grondduikers op Gasselter Nijeveensche mond en verder op het 2° pand van het Stadskanaal.

letter aangeduid of het gemaal werkt als scheprad, pomp of centrifugaalpomp, benevens in cijfers het aantal paardenkrachten. Voorboezems van molens zijn aangegeven als tot den boezem te behooren (zie het zuidelijke stoomgemaal in 29).

Molenboezems, waardoor het polderwater van den eenen molen naar den anderen gemalen wordt, hebben geen boezemkleur, maar worden ak polderwater aangemerkt; immers, zoolang het nog niet op den boezem is uitgeslagen ligt het nog niet met den boezem gemeen, al kan het ook niet meer in den polder terugkeeren.

Molens, die rechtstreeks op den boezem uitslaan, zijn alleen door hunteeken aangegeven; lager geplaatste molens zijn met een cijfer 2, 3 enzv. gemerkt, met dien verstande dat de laagst geplaatste molens het hoogske cijfer hebben. Bij eenige molens in (12), (22) en (29) aangeduid is dit zichtbaar. Bij maalwerktuigen waarvan de bedoeling niet terstond blijkt is dikwijls op de kaart door bijschrijving in rood de bestemming toegelicht.

G. VERDERE TEEKENS EN AANWIJZINGEN.

In de polders zijn de grootten in hectaren, gemeten tusschen de kruinen der dijken, aangegeven. Eenvoudigheidshalve is dit op de schets weggelaten.

De gereglementeerde polders hebben een zomerpeil waarop het water in de slooten moet gehouden worden; dit zomerpeil is in elken polder aangegeven. Veelal kan men hieruit ongeveer de werkelijke terreinhoogte vinden, wanneer men slechts weet of het betrokken perceel weiland, bouwland of boomgaard is; men heeft slechts bij de zomerpeilen 0,5,0,8 of 1,2 M. op te tellen, omdat men weet dat het slootwater bij die bebouwingstypen bij voorkeur op de genoemde afstanden beneden het terrein gehouden wordt.

In niet gereglementeerde polders bestaat geen zomerpeil; men heeft daarbij echter nagegaan hoe hoog in den regel het water in de slooten gehouden wordt en dit vermeld als zomerstand. De hoogten van dijken en kaden staan op de kaart vermeld.

Wanneer boezems maal- of stempelpeilen 1) hebben, zoeke men die aanwijzing in het randschrift onder het hoofd: boezems.

¹⁾ Stempelpeil is de boezemstand beneden welken geen water meer uit den boezem in den polder mag worden afgelaten; men vindt die grens wel eens bij kleine boezems die toch voor de scheepvaart moeten blijven dienen.

Langs de oevers der zee en der groote rivieren vindt men de werken tot oeververdediging, kribben, hoofden enzv., de diepten beneden laagwater of middelbaren rivierstand, alsmede eene korte beschrijving der voornaamste havens.

Keer- en inundatiesluizen zijn door eene letter op de kaart aangegeven, terwijl men verdere gegevens vindt in het randschrift.

De terreinhoogten van gronden (niet in polders) zijn in rood op de kaart aangeduid.

Peilschalen en peilmerksteenen, voor het overbrengen of controleeren van A. P., zijn op de kaart door een teeken vermeld.

Omtrent de administratieve indeeling der polders vindt men in het randschrift:

Indeeling in waterschappen, heemraadschappen, polderdistricten enzv. Het beheer en de contrôle door autoriteiten uitgeöefend.

Octrooyen en concessiën voor droogmakerijen, verveeningen enzv.

Opgave der reglementen geldig voor verschillende polders, kanalen, afwateringen enzv.

Opgave der voornaamste wetenschappelijke werken, afzonderlijke beschrijvingen, adviezen van deskundigen enzv. die licht verspreiden over de toestanden, die op elk blad voorkomen.

Wij hebben gemeend deze opgaven slechts algemeen te moeten aanduiden; bij de bestudeering van elk blad vallen die toelichtingen van zelf in het oog.

H. VERVAARDIGING.

Hieromtrent, en meer bepaald over de opname op het terrein, slechts een enkel woord, daar de practijk den opnemer meer leert dan uitgebreide instructiën, die trouwens niet bestaan. De zwarte onderdruk waarvan reeds meermalen sprake was, wordt in stukken van handelbaren vorm verdeeld en aan de ingenieurs ter hand gesteld, die belast worden met de opname.

Vooraf hebben deze heeren eene speciale studie moeten maken van het terrein hunner werkzaamheden, tot het verkrijgen van een algemeen denkbeeld der streek. De grondslag van die studie wordt gevormd door verschillende officiëele gegevens als:

Concessiën tot den aanleg van kanalen en vaarten, tot het doen van verveeningen, dikwijls ook oude oorkonden waarbij in vroegere eeuwen dergelijke vergunningen zijn verleend. Er zijn er die tot de 13° eeuw opklimmen.

Projecten en bestekken voor de uitvoering der werken waarbij de waterafvoer op eenigerlei wijze is betrokken.

Provinciale verordeningen op waterafvoer, op voorzieningen tegen zandverstuivingen enzv.

Polderreglementen en reglementen op de wegen, maalwerktuigen en grondpompen.

Registers van waterhoogten voor zooverre geregelde waarnemingen worden gedaan; verslagen aan den Koning over Openbare Werken en provinciale verslagen.

Heeft de ingenieur zich, door bestudeering dezer bescheiden, een algemeen denkbeeld gevormd en door conventioneele teekens op zijne kaart gebracht wat hij nu reeds als onomstootelijk kan vaststellen, dan gaat hij, met de aldus geprepareerde kaart, op het terrein en wel in den regel het eerst naar de watermolenaars en sluiswachters. Deze ambtenaren zijn in den regel op een beperkt gedeelte van het terrein, voor zooverre het gebied van hun molen of sluis reikt, zeer goed te huis en hebben, door jaren lange waarneming en ervaring, geleerd hoe en onder welke omstandigheden de verschillende polders en détail afwateren. Van den molen uitgaande doorloopt nu de opnemer het geheele terrein, geeft acht op den waterstand binnen en buiten den polder en op het verband met nevenliggende.

Ontmoet hij, bij dien tocht, wateren die andere peilen hebben, dan moet hij deze nagaan tot zij in een of ander boezemgebied terecht komen. Zoo gaat de tocht van den eenen molen op de anderen voort, en bekomt de waarnemer, geleid door inlichting der gemelde gidsen, maar vooral door eigen aanschouwing, een nauwkeurig beeld van den geheelen toestand.

Hoewel vermoeiend en veelomvattend is de opname van bemalen landen nog het gemakkelijkst, daar de maalwerktuigen en hunne bewakers hier veelal den weg wijzen.

Lastiger is de opname in hooge gronden en veenstreken waar molens ontbreken. Hier moeten de kleine waterloopen een voor een worden gevolgd om te zien waar zij hun* oorsprong en uitmonding hebben, en zoo goed mogelijk de waterscheidingen op te sporen. In drooge zomers, wanneer weinig water wordt afgevoerd is dit soms zeer moeielijk, omdat dan sommige waterloopen droog zijn; bij sterken waterafvoer stuit hij vaak op onbegaanbare terreinen. In de eigenlijke veenstreken zijn soms terreinen zonder zichtbaren waterafvoer en ontbreken dikwijls behoorlijk vastgestelde verkenmerken.

De dwarskanalen, wijken en slooten moeten daar dikwijls over groote uitgestrektheden worden afgeloopen, om te zien welken dienst zij bij den waterafvoer doen en op alle duikers, sluisjes en schutten nauwlettend acht gegeven worden.

Na alzoo meerdere dagen op het terrein doorgebracht te hebben, moet de waarnemer geruimen tijd wijden aan de teekening der kaart en het bijhouden der registers waarin al het opgemerkte wordt vermeld.

De kaart wordt, nadat eenige aaneensluitende bladen gereed zijn, in het net geteekend, de randbeschrijving er bij gevoegd en ter verdere behandeling gezonden aan de Topografische Inrichting. Omtrent de wijze van reproductie aldaar, kan hier niet in bijzonderheden getreden worden. Een uitvoerig verslag daarvan vindt men in de Verslagen der Vereeniging ter beoefening der Krijgswetenschap (1889) van den Heer Eckstein, den verdienstelijken Directeur dier Inrichting.

Aan het einde onzer mededeelingen moeten wij verschooning vragen voor de vluchtigheid dezer schets. Talrijke bijzonderheden moesten wij, om redenen van tijd en plaats, onbesproken laten. Om een werk van zóó fijne samenstelling met zóó oneindig veel details, grondig te leeren kennen is slechts één middel, n. l. gezette en ijverige studie der kaart, liefst met waarneming op het terrein gepaard. Men beschouwe dit overzicht dus slechts als eene poging om tot die studie op te wekken. Wij hopen dat dit weinige voldoende moge zijn om den lezer te doen instemmen met een woord van lof en hulde aan de ingenieurs-opnemers, en den Algemeenen Dienst van den Waterstaat, die door hun ijver en nauwkeurigheid een kaartenwerk gewrocht hebben, dat, naar wij meenen, geheel eenig is in zijn soort en ook buitenslands onverdeelde bewondering heeft gewekt.

's Gravenhage, Augustus 1890.

BIJDRAGE TOT DE KENNIS VAN FRIESLANDS BODEM. II.

EENIGE MEDEDEELINGEN BETREFFENDE DE GAAS-TERLANDSCHE KLIFFEN

DOOR

Dr. H. VAN CAPPELLE.

Aan de lezers van dit tijdschrift is het reeds bekend, dat door mij, op het in April van het vorig jaar te Leiden gehouden tweede Natuuren Geneeskundig Congres, eenige mededeelingen werden gedaan betreffende het Roode en Mirdumer Klif aan de zuidkust van Friesland. De heer Timmerman toch bood hun reeds een kort verslag aan van hetgeen in de sectie voor Geologie en Physische geographie behandeld werd. Wegens den korten tijd, waarover ieder spreker uit den aard der zaak beschikken kon, was het mij toen niet mogelijk in details te treden en moest ik een aantal waarnemingen voor eene meer uitgebreide verhandeling over de Gaasterlandsche kliffen bewaren, waarvan ik de verschijning toen reeds met een enkel woord aankondigde en die nu onlangs in het "Bulletin de la Société Belge de Géologie, de Paléontologie et d'Hydrologie" het licht heeft gezien 1). Ook den Nederlandschen lezer meen ik echter eenige uitvoeriger mededeelingen over bovengenoemde diluviale hoogten verschuldigd te zijn, en in welk tijdschrift zal ik eene grootere belangstelling voor dit onderwerp mogen verwachten, dan in dat van het Aardrijkskundig Genootschap --- het orgaan van de beoesenaren eener wetenschap, welke tot de geologie in zulk een nauwe betrekking staat?

De beide laatste jaargangen van dit tijdschrift hebben den lezer gelegenheid gegeven, zich van de richting, welke de geoloog tegenwoordig bij de studie van het diluvium inslaat, eenigszins op de hoogte te stellen en hebben hem getoond, welk een uitgebreid veld van onderzoek voor

¹⁾ Deel III, November 1889.

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Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap. 1890.



Het Roode Klif nabij Stavoren, van den zeedijk gezien, niet ver van Laaxum. (Naar eene photographie van den Heer Joh. Gorter).

Ph. Z.

den Nederlandschen geoloog openligt, die de diluviale vormingen zijns vaderlands aan de hand der gletscher-theorie bestudeeren wil.

Naar menig plekje van ons diluvium is hij reeds in gedachte heengeleid en uit waarnemingen aan en onder de oppervlakte heeft hij reeds belangrijke conclusies omtrent de vormingswijze dier gronden leeren maken - gevolgtrekkingen, welke volkomen overeenstemden met die, waartoe de diluviale gronden van Noord-Duitschland aanleiding gaven. Voor het meerendeel waren het plaatsen op het Gemengde- en het Rijndiluvium, waar de inwendige bouw des bodems nauwkeurig kon bestudeerd worden. De weinige punten op het gebied van het Skandinaafsch diluvium echter, waar na het jaar, waarin Torell zijne gletscher-theorie uitsprak, door geologen waarnemingen werden gedaan, leerden wel reeds eenige belangrijke verschijnselen kennen, vooral op den aard en de verspreiding der gesteenten betrekking hebbende, of gaven somtijds tot belangrijke theoretische beschouwingen aanleiding, doch tot het onderzoeken van de structuur des bodems bood zich, behalve op den Hondsrug, geene gelegenheid aan en de duur dier bezoeken was meestal te kort om in die richting opzettelijke nasporingen te doen.

Het was daarom dat ik — mede daartoe opgewekt door de niet onbelangrijke resultaten van het onderzoek der vier in deze provincie verrichte en door mij onlangs ook in dit tijdschrift besproken putboringen 1) — het plan opvatte, eenige punten van het Friesch diluvium nauwkeuriger te onderzoeken dan tot hiertoe het geval was geweest en te trachten ook in deze provincie eenige meerdere bewijzen voor eene vroegere vergletschering op te sporen.

Het Bestuur van het Friesch Genootschap voor Geschied-, Oudheiden Taalkunde toonde door den finantiëelen steun, dien het zoo welwillend was mij te verleenen, het groote belang van eenige meerdere kennis van den Frieschen bodem volkomen te begrijpen, voor welk bewijs van belangstelling een woord van dank ook hier niet achterwege mag blijven.

De plaatsen nu, welke het eerst tot een zoodanig onderzoek uitlokten, waren de drie Gaasterlandsche kliffen — de steile hoogten aan de zuidkust dezer provincie —, die om hun grooten rijkdom aan steenen en om hunne gelijkenis met echte klippen reeds lang een zekere vermaardheid bezitten en waarvan er slechts een, nl. het Roode Klif, door Staring in zijn "Bodem van Nederland" genoemd wordt²).

¹⁾ Meer uitgebr. artikelen, jaarg. 1888, No. 1.

²⁾ Deel II, blz. 30.

Een bezoek, door mij in het vorig jaar aan laatstgenoemde hoogte gebracht, deed reeds verwachten, dat een nauwkeurig onderzoek deze kliffen ons met meer feiten zou in kennis stellen, dan Dr. Lorié wigens zijn kort bezoek!) aan dit deel van ons vaderland in staat was de lezers van dit tijdschrift mede te deelen?). Met de eenvoudige vermed ding, dat de kliffen aan de zuidkust van Friesland brokstukken eend morainevorming van het diluviale landijs zijn, kan de geoloog zeker niet tevreden zijn. Welke structuur bezit deze moraine? Welke zijn de belangrijkste gesteenten, die zij insluit? Welke eigenschappen bezit de grond, waarop zij rust en welke diluviale vormingen, die jonger zijn, zijn in de onmiddellijke nabijheid ontwikkeld? — ziedaar vragen, wier oplossing voor eene kennis van het Skandinaafsch diluvium van groot gewicht moest geacht worden en die wellicht in staat zouden zijn, ook over meer algemeene quaesties, het Nederlandsch diluvium betrekking hebbende, licht te verspreiden. —

De wandelaar, die, nadat hij de laatste woningen van Stavoren achter den rug heeft, den dijk volgt, welke de zuidkust van Friesland voor het grootste deel beschermt, wordt al spoedig een scherp tegen den horizon zich afteekenende hoogte gewaar, die naar de zeezijde vrij steil is afgebroken, doch naar de landzijde zacht glooiend afloopt. Dadelijk treft hem bij het betreden van dezen getsoleerden, te midden van een vlak terrein zich verheffenden, heuvel, het eigenaardig karakter der flora. Na geruimen tijd langs eentonige weilanden te zijn voortgegaan en de weinige, aan de kleibewoners zoozeer bekende, plantensoorten te hebben opgemerkt, vindt hij zich plotseling op een hoogte verplaatst, die aan een groot aantal plantensoorten, welke aan diluviale zandgronden eigen zijn, tot groeiplaats strekt: Linum cutharcticum L., Ornithopus perpusillus L., Hieracium Pilosella L., Jasione montana, Statice elongata Hoffm. drukken reeds genoegzaam het karakter dezer flora uit. Vooral in het midden van den zomer, wanneer de naar het land toegekeerde zachtglooiende helling met rogge bebouwd is, waartusschen zich hier en daar de hemelsblauwe hoofdjes der korenbloemen verheffen, maakt het Roode Klif op den wandelaar een verrassenden indruk.

Wanneer wij den weg, die ons langs den voet van den zeedijk tot aan

¹⁾ Eene porientirungsreise".

Beschouwingen over het Diluvium van Nederland, Meer uitgebr. artikelen, jaargang 1887, No. 2, blz. 433.

et klif voerde en die over dezen heuvel heenloopt, verlaten en den dijk an de zeezijde afdalen, dan betreden wij een 18-23 M. breed strand, at zich alleen vóór het klif uitstrekt en deze hoogte van het paalwerk cheidt, hetwelk men in het jaar 1829 genoodzaakt is geweest aan te eggen wegens de groote verwoesting, die de golven er in de voorafgaande jaren hadden aangericht. Loopen wij dit strand langs den voet ran de steile helling ten einde, dan bemerken wij, dat het klif in het nidden de grootste hoogte, nl. ± 11 M. bezit, en van dit punt af in N. N. westelijke en Z. Z. oostelijke richting voortdurend afloopt, om langzaam in den zeedijk over te gaan. Vertoont het voor den oppervlakkigen seschouwer, op eenigen afstand gezien, eenige overeenkomst met een teil duin, bij nauwkeuriger waarneming blijkt het, dat het niet uit los luinzand kan zijn opgebouwd, doch uit een veel hardere grondsoort moet zijn samengesteld: nabij den bovenrand toch heest het regenwater, dat voortdurend brokken van den harden grond naar beneden doet storten, op vele plaatsen een bijna loodrechten wand gevormd en daar het overige gedeelte van het Roode Klif, met uitzondering van enkele plekken, waar het van boven afvloeiende regenwater meer of minder diepe geulen deed ontstaan, met gras bedekt is, heeft men nabij dezen rand de beste gelegenheid, om een oppervlakkig onderzoek naar den aard des bodems in te stellen.

De diluviaal-geoloog gevoelt zich hier al dadelijk op bekend terrein: in het geele, uiterst harde leem, waarin, zonder eenige schifting volgens de grootte, steenbrokken van verschillende afmetingen en van verschillenden vorm zijn ingesloten, herkent hij onmiddellijk de bekende keimergel of blokleem, die als eene moraine van het diluviale landijs moet worden beschouwd. Kan aan de juistheid dezer verklaring, gelijk den lezer reeds uit het opstel van Dr. Lorié duidelijk gebleken is, niet meer worden getwijfeld, verwonderen doet het ons niet, dat de vorming van het Roode Klif door vroegere schrijvers - en zelfs tegenwoordig nog door de omwonende bevolking - aan geheel tegengestelde werkingen werd toegeschreven. Moeten wij volgens de hedendaagsche wetenschap in het Roode Klif een product van het landijs zien, de geleerden van vroeger dagen wisten zijn oorsprong niet anders dan aan vulkanische werkingen toe te schrijven; de talrijke steenbrokken die in het klif begraven liggen en die wellicht voor vulkanische bommen werden gehouden, alsmede de aanwezigheid onder deze brokken van gesteenten, waarin men eene soort van lava meende te herkennen, zullen ongetwijfeld tot deze opvatting aanleiding hebben gegeven. Kan het ons dus verwonderen dat oudere schrijvers de verhalen, die omtrent werkelijk plaats gehad hebbende uitbarstingen door de volksphantasie geboren waren geworden, voor waarheid aan de goê gemeente hebben verkondigd? Wanneer wij bijv. bij Ocha Scharlensis, een schrijver uit de achtiende eeuw, lezen van een "vur"rige vlamme, die in 't voorz. jaar van vier op 't zuidwest van den berg,
"die men het Rode Clif noemt ontsprong" en welke drie dagen duurde,
ja zelfs van een grooten draak vernemen, die op den vierden dag uit
dezen heuvel kwam vliegen, "tot een verschrikkinge van velen" zich zer
hoog in de lucht verhief, doch daarna in het klif weder verdwenen is, das
kunnen wij, die deze hoogte als een voortbrengsel van de groote ijsperiode
beschouwen, een glimlach niet bedwingen '). Doch laten wij trachten
meerdere bewijzen op te sporen voor de meening, dat het Roode Klif bet
brokstuk eener moraine van het diluviale landijs is.

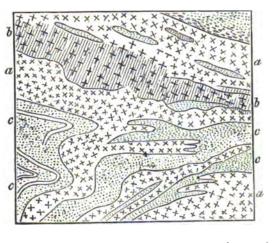
Aan een nauwkeurig onderzoek dezer hoogte zijn vele bezwaren vebonden: de grasbedekking en de, bij heftige regens voortdurend van de hoogere punten asspoelende, leemdeelen verbergen hare oorspronkelijke structuur aan ons oog, zoodat opzettelijke gravingen moeten vericht worden om in den bouw des bodems een blik te slaan. Het is dan ook zeer te begrijpen waarom Dr. Lorié in zijne beschouwingen over het Skandinaafsch diluvium (dit tijdschrift, l. c. blz. 433—440) het Roode Klif slechts terloops noemt en voornamelijk over "de Voorst", de merkwaardige hoogte aan de Overijsselsche kust, spreekt, waar men door den golfslag, die hier voortdurend werken kan, altijd een frisschen, negenoeg vertikalen wand aantreft.

Wanneer wij op verschillende plekken, waar de grasbedekking ontbreekt, den bovengrond verwijderen en den bodem onderzoeken, dan blijkt het reeds dadelijk, dat de bouw van het Roode Klif vrij wat samengestelder is, dan eene oppervlakkige waarneming zou doen vermoeden. Hier toch vinden wij een zanderige, geele, roodbruine of somtijds blauvgrijze leemsoort, waarin talrijke grootere of kleinere steenbrokken zin ingesloten; ginds is het zandgehalte van het leem zóó gering, dat het in vochtigen toestand een uiterst taaie kneedbare massa, in droogen toestand daarentegen brokken van een zoodanige hardheid vormt, dat zij met een hamer slechts met moeite kunnen worden gebroken; elders bestaat de grond van het klif niet uit leem, doch uit zand met veel steenen en op enkele plaatsen ligt zelfs zuiver zand zonder een enkel steenbrok.

¹⁾ In een lezenswaardig opstel over het Roode Klif van J. J. Bruinsmain & Nieuwe Friesche Volks-Almanak van 1863, waarin de vulkanische oorsprong dem hoogte bestreden wordt, kan de lezer hierover meer vinden.

Daar deze herhaalde verschillen in de samenstelling, welke op vele plaatsen, waar de moraine van het diluviale landijs ontwikkeld is, worlen waargenomen en veelvuldig door de reeds bij den lezer van dit tijdchrift bekende verschijnselen van plaatselijke gletscherwerking, als plooiinen, buigingen en doorelkanderknedingen van den bodem, begeleid worden, wam het mij in hooge mate waarschijnlijk voor, dat deze merkwaardige tructuur, die in het gebied van het Skandinaafsch diluvium nog slechts in len Hondsrug 1), nl. door den hoogleeraar Van Calker nabij het dorpje Helpman waargenomen is, ook van de moraine van het Roode Klif zou kunnen worden aangetoond. Niets ware gemakkelijker geweest dan het opsporen van dit verschijnsel: de doorsnede was ons reeds door de natuur aangeboden; het kwam er dus slechts op aan, de grasbedekking en de veranderde buitenste laag, die de oorspronkelijke structuur voor ons oog verborgen hield, hier en daar weg te nemen - eene bewerking, die aan deze zeewering (wier voet slechts bij buitengewoon hoog water door de golven bereikt wordt) naar mijne meening geen schade had gedaan. De Gedeputeerde Staten dezer provincie hadden echter eene andere meening omtrent deze zaak en weigerden mijn verzoek.

Het toeval wilde echter, dat bij een mijner bezoeken een leembrok na een heftige regen was losgeraakt en op ongeveer 7 M. afstand van den bovenrand een inham had gevormd, waarin de genoemde structuur zeer fraai te voorschijn kwam. Na wegruiming van den overtolligen grond werd aldus een profiel zichtbaar, dat hiernevens op een schaal van 1 op 19 is afgebeeld.



Uit dit profiel, dat van het N. N. W. naar het Z. Z. O. georienteerd is en eene lengte van 1,12 M. op een hoogte van 1 M. bezit, zien wij weder dat het Roode Klif niet uitsluitend uit leem bestaat, doch dat zand (c) en leem (a) herhaaldelijk met elkander afwisselen. Deze beide

¹⁾ F. J. P. van Calker, Ueber glaciale Erscheinungen im Groninger Hondsrug. Zeitschr. d. Deutsch. geol. Gesellsch., Jahrg. 1888, p. 258)

bestanddeelen nu zijn op de vreemdsoortigste wijze gebogen, geplooid a door elkander gemengd, hetgeen door de scherp begrensde, in het zan geperste golf- en tongvormige leemstrooken dadelijk in het oog valt.

Leeren wij dus hier weder eene karakteristieke eigenschap der onder of langs den rand van een gletscher zich vormende moraine kennen, n.l de aanwezigheid van laagsgewijs afgezette gedeelten, die door de voortschuivende beweging van het ijs door elkander gekneed zijn geworden, opvallend is tevens het verschil, dat het leem uit dit profiel met het hoogerop in het klif liggende leem vertoont en dat met het verschil in vormingswijze ten nauwste samenhangt. Terwijl het eerste zeer zanderig is (dus tusschen de vingers onmiddellijk uiteenvalt) en daar, wast het een grijze kleur bezit (b. in ons profiel), zeer kalkhoudend is en een aantal witte zeer kalkrijke laagjes bevat, die er in allerlei richtingen doorheen loopen, is het laatstgenoemde, veelal steenrood gekleurde leem, hetwelk bovenaan in dezen heuvel ligt, niet kalkhoudend en in droogen toestand zóó hard, dat het slechts door een hamer kan worden gebroken. Deze verschillen hebben ons aanleiding gegeven, de roodbruine uiterst harde leemsoort als de oorspronkelijke keimergel te beschouwen en het hier en daar grijsgekleurde, zeer zanderige leem van ons profiel met het ermede afwisselende zand daarentegen als de laagsgewijs afgezette uitspoelingsproducten der moraine op te vatten.

Bij deze uitspraak hebben wij ons vooral laten leiden door het verschil in samenhang van de bestanddeelen dezer beide leemsoorten en niet door het verschil in kleur, daar het grijze leem (b), gelijk wij in ons profiel hebben aangegeven, tegenover het omringende, eveneens zanderige, geel-roode leem (a) niet scherp begrensd is en daar het reeds een week, nadat het aan de oppervlakte was gebracht, door atmospherische invloeden in rood leem was overgegaan. Dat slechts in het grijze door ons in de diepste deelen van het klif aangetroffen leem een vij aanzienlijk kalkgehalte kon worden aangetoond, moet eveneens aan de chemische werking van het regenwater worden toegeschreven, hetwelk de kalk overal, waar het met het leem in aanraking kwam, meevoerde.

Ook uit een bezoek aan het, op een kleine drie uur afstands in oostelijke richting van het Roode Klif gelegen, Mirdumer Klif is de juistheid onzer meening duidelijk gebleken. Dit klif dat wegens zijn veel grootere lengte en wegens zijn schoonen, niet met gras bedekten loodrechten wand een studie van de structuur der moraine veel gemakkelijker maakt, bleek mij oorspronkelijk uit een grijs, hier en daar zeer veel kalk bevattend, uiterst hard, leem te zijn samengesteld, dat door atmospherische

invloeden langzamerhand een geelroode kleur aanneemt en zijn kalk verliest.

Alvorens van ons profiel af te stappen, wensch ik ook den Nederlandschen lezer nog op één verschijnsel te wijzen, dat de medewerking der smeltwateren bij de vorming van de onderste deelen van het Roode Klif duidelijk aantoont. Onder de steenen n.l., die ik uit de golf- of tongvormige grijze leemstrooken te voorschijn haalde, kwamen eenige brokken van een uiterst hard kalkconglomeraat voor, hetwelk men zonder nauwkeurig onderzoek voor een gesteente zou kunnen houden, dat, evenals de andere steenbrokken van het Roode Klif, door de ijsmassa van uit noordelijke of noord-oostelijke streken hierheen is gevoerd. De stukken zijn geel of geelgrijs van kleur door het overheerschen van het kalk- en kleiachtig cement, hetwelk de verschillende bestanddeelen samenbindt. Wanneer wij door middel van zoutzuur de grootere of kleinere steenbrokjes, waaruit het conglomeraat is samengesteld, vrij maken, dan verkrijgen wij zand of grint, uit volkomen dezelfde elementen gevormd als waaruit het zanderige leem, waarin het begraven ligt, is opgebouwd: kwartskorrels vormen het hoofdbestanddeel, daarnevens echter komen veldspaathkorrels, vuursteenbrokjes, graniet- en kalksteenfragmenten voor kortom, stukjes van alle gesteenten, waarvan het Roode Klif grootere brokken insluit. Is het dus duidelijk, dat dit harde conglomeraat geen erratisch gesteente is, doch dat het op de plaats zelve ontstond door vereeniging van de elementen der morainevorming door middel van een kalkachtig slib, uit de vergruizing van kalksteenbrokken gevormd, tevens blijkt het, dat niet het doorzijpelend regenwater, doch de onder de ijsmassa vloeiende smeltwateren de vereeniging van bovengenoemde steenbrokjes hebben tot stand gebracht. Ook in het roode, ontkalkte en ongemerkt in het grijze overgaande zanderige leem (a) trof ik immers eenige stukken van dit kalk-conglomeraat aan, waarbij in de oppervlakkige deelen geen spoor van kalk meer kon aangetoond worden.

Was nu boven het hier beschreven profiel slechts de echte keimergel ontwikkeld, ook er onder bleek deze vorming zich nog tot aan den voet van den steilen wand voort te zetten. De aanzienlijke dikte der moraine op deze plaats (minstens 11 M.) behoeft ons echter niet te verwonderen, daar wij haar in ons vorig opstel (l. c. blz 175) te Grouw op minstens 10 M. konden aangeven. Wel kan het ons bevreemden, dat zij op een plaats, die zóó hoog gelegen is (tot 11,51 M + A.P.), zulk een groote dikte bereikt, omdat de vier in Friesland verrichte putboringen op nieuw den reeds vroeger door Lorié medegedeelden regel bevestigd hebben

(l. c. blz. 440), dat de blokleem doorgaans niet op de hoogten, doch meer in vlakkere en lagere terreinen ontwikkeld is. Op deze schijnbare afwijking zullen wij straks nog gelegenheid hebben terug te komen (blz. 797).

In de voorgaande bladzijden hebben wij dus eenige nieuwe bewijzen leeren kennen voor de uitspraak van Dr. Lorié, dat het Roode Klif het brokstuk eener morainevorming 1) is.

Doch ook het groot aantal steenen, uit het noorden of noordoosten hierheengevoerd, wijzen door hun eigenaardigen vorm en door de eigenschappen, die hunne oppervlakte veelal vertoont, niet minder duidelijk op eene vroegere gletscherwerking op deze plaats. Zij hebben n.l. zelden een volkomen ronden of ovalen vorm, zooals men dit bij steenen, die langen tijd door het water heen en weer zijn gerold, verwachten zou, doch de meesten hebben een zeer onregelmatigen vorm, bezitten afgeronde kanten, en vertoonen eene oppervlakte, die veelal fraai gepolijst is en somtijds duidelijke gletscherkrassen vertoont. Het fraaist hebben wij deze eigenschappen bij eenige graniet- en kalksteenbrokken kunnen waarnemen.

Het is den lezers van dit tijdschrift reeds bekend, van hoe groot belang eene studie der erratische gesteenten voor eene kennis van het diluvium is, vooral van die, welke in eene moraine ingesloten zijn. Door de natuur nu was ons hier, evenals voor Prof. K. Martin te Urk (zie het opstel van den Leidschen Hoogleeraar over dit eiland ?)), eene gelegenheid aangeboden, om zeer gemakkelijk van zulke steenen eene belangrijke collectie bij elkander te brengen. Ook op het voor het klif zich uitstrekkende strand liggen n.l. zooveel steenbrokken verspreid, die eenmaal in het klif ingesloten waren en er door het zeewater in den loop der tijden zijn uitgespoeld, dat wij ons de moeite bespaard hebben, in de harde keimergel zelf te zoeken. Wij waren echter genoodzaakt slechts op steenen van kleinere afmetingen te letten, daar hier en daar op het strand groote steenbrokken liggen opgehoopt, welke men tot verbetering van den zeedijk van elders aangevoerd heeft. Doch niet alleen het strand voor het Roode Klif, nog meer dat, hetwelk voor het veel langere Mir-

¹⁾ Lorié spreekt overal van grondmoraine.

²⁾ Het eiland Urk, benevens eenige algemeene beschouwingen over de geologie van Nederland. (Tijdschr. v. h. Kon. Ned. Aardr. Gen. Verslagen en Aardrijksk. Medel. 1889, blz. 7).

dumer Klif zich uitstrekt, leverde voor het onderzoek naar de gesteenten der moraine een belangrijk materiaal op.

Tot het vervullen van deze niet gemakkelijke taak, verkeerde ik echter in de ongunstigste omstandigheden. Reeds meermalen is reeds in dit tijdschrift op de groote bezwaren gewezen, die men bij eene herkomstbepaling van erratische gesteenten ondervindt. Daar men vooral dan kans loopt, onjuistheden te begaan, wanneer men niet over vergelijkingsmateriaal kan beschikken en dus gedwongen is de bepalingen volgens beschrijvingen te verrichten, heb ik mij, bij de bewerking van de erratica uit de morainevorming aan Friesland's zuidkust, slechts bepaald tot die sedimentaire gesteenten, die onze aandacht het meest waard zijn en heb ik mij aan eene herkomstbepaling slechts voor die steensoorten gewaagd, die ook zonder origineele handstukken gemakkelijk te herkennen waren. Hier kunnen wij volstaan met eene korte vermelding der voornaamste door ons aangetroffen steensoorten.

Gelijk te verwachten was in een streek, die tot het gebied van het Skandinaafsch diluvium behoort, zijn behalve de vuursteenen, de vulkanische gesteenten in de keimergel het rijkst vertegenwoordigd. Graniet is het voorheerschende gesteente, dat in een aantal variëteiten optreedt; gneiss, amphiboliet, syeniet, dioriet worden daarnevens zeer veelvuldig aangetroffen en ook porphier komt, hoewel in minder talrijke brokken, voor. Doch het zijn vooral de sedimentaire gesteenten, die voor ons, om bekende redenen, van veel grooter gewicht zijn. Die welke wij hier niet met stilzwijgen willen voorbijgaan, behooren tot drie geologische formaties, n.l. tot de Cambrische, de Silurische en de Krijtformatie.

Onder de zandsteenen en kwartsieten, welke de keimergel aan Friesland's zuidkust in groote hoeveelheid insluit en welke ongetwijfeld van cambrischen en silurischen oorsprong zijn, is er een, die vooral onze aandacht trekt, en waarvan ik in het Roode Klif een 7 cM. groot afgerond brok en in het Mirnser Klif—dat tusschen het Roode en het Mirdumer Klif gelegen is, doch dat voor den geoloog van minder belang is wegens zijne geringe hoogte en wegens de grasbedekking, die niet alleen op het klif, doch ook op de tusschen het klif en het paalwerk zich uitstrekkende strook gronds wordt aangetroffen— een even groot plat stuk gevonden heb. Het is een geelgrijze kwartsietachtige zandsteen, die door zijn gevlekt of gestreept uiterlijk dadelijk in het oog valt. Bij het doorslaan blijkt het, dat deze strepen of vlekken het gevolg zijn van 11/2—2 mM. breede cylindervormige stengels, die zich als rechte, enkele malen ook als flauw gebogen kanalen voordoen, welke met denzelfden, eenig-

zins donkerder gekleurden, zandsteen zijn opgevuld. Onmiddellijk herkennen wij in dit gesteente den bekenden cambrischen Skolithen-zandsteen, zoo genoemd naar deze stengels, die men aan, later door steenmassa opgevulde holruimten van borende wormen heeft toegeschreven, welke door Hall met den naam van Scolithes zijn aangeduid geworden.

Is dit gesteente vooral daarom van belang, omdat zijn herkomst uit Zweden (waarschijnlijk Zuid-Zweden) niet betwijfeld kan worden en omdat het de eerste maal is, dat het in ons diluvium werd aangewezen, van niet minder belang zijn de bovensilurische kalken, waarvan ik aan bet Roode en het Mirdumer Klif eene belangrijke verzameling kon bijeenbrengen en wier aanwezigheid wij reeds vermoedden, toen het boven beschreven grijze, zeer kalkhoudende leem aan het licht kwam. Vooral op het strand vóór het laatstgenoemde klif liggen zooveel brokken van dezen kalk verstrooid, dat de andere gesteenten er bijna door op den achtergrond worden gedrongen. Na de waarneming, dat deze kalksteenen slechts op enkele plaatsen van het strand verspreid zijn (n.l. zoowel aan het Roode als aan het Mirdumer Klif vóór de meest naar het Oosten gelegen punten) is het niet moeielijk, ook uit de keimergel zelf eenige stukken, somwijlen met eene gepolijste en van gletscherkrassen voorziene oppervlakte te voorschijn te halen. Het blijkt dus dat Groningen en Urk niet de beiden eenige plaatsen in ons diluvium zijn 1), die wegens de groote hoeveelheid bovensilurische kalken merkwaardig zijn en de opmerking van Martin, dat op eerstgenoemde plaats de Koraalkalken, op Urk daarentegen de Beyrichienkalken de overhand hebben, en dat op dit eiland laatstgenoemde kalksteen vooral in zijnen typischen ontwikkelingsvorm in groote hoeveelheid wordt aangetroffen, deed als van zelf de vraag bij ons oprijzen, hoe het in dit opzicht met de derde door ons ontdekte vindplaats gesteld is.

Wanneer men nu de door mij bijeengebrachte verzameling 2) overziet, dan bespeurt men met één oogopslag, dat ook hier de typische Beyrichienkalk een hoofdrol speelt. De overeenkomst, welke deze kalken vertoonen met de kalkbrokken, die Martin uit de keimergel van Urk 2) beschrijft, is zelfs zóó groot, dat wij zijne mededeelingen hier bijna woordelijk zouden kunnen naschrijven; ik meen dan ook den Ne-

l) K. Martin, l.c. blz. 15.

²⁾ Deze collectie zond ik grootendeels aan het Museum van het Friesch Genootschap te Leeuwarden, terwijl de duplicaten aan het Geologisch Museum te Leiden werden afgestaan.

³⁾ l. c. blz. 7-9.

derlandschen lezer te kunnen verwijzen naar het reeds meermalen genoemde opstel van den Leidschen Hoogleeraar, daar de weinige opmerkingen, die zonder vergelijkingsmateriaal over deze kalken konden gemaakt worden, voor den niet-geoloog van zeer weinig belang zijn.

Doch niet alleen wegens de bovensilurische kalksteenen is de morainevorming van de Gaasterlandsche kliffen onze aandacht waard, ook de
krijtgesteenten, die zij insluit, zijn niet zonder gewicht. Reeds de talrijke
vuursteenen leeren het belangrijk aandeel kennen, dat deze vorming aan
den opbouw dezer moraine heeft gehad. Hoewel deze vuursteenen natuurlijk overeenkomen met die, welke uit andere punten van het Skandinaafsch diluvium bekend zijn geworden, kunnen wij hen hier toch niet
met stilzwijgen voorbijgaan.

Wat in de eerste plaats hun vorm aangaat, zoo troffen wij nevens de bekende scherpkantige brokstukken, waarin zij plegen voor te komen, ook duidelijk afgeronde brokken aan, die met den naam van "Wallsteine" (Meyn) 1) moeten worden aangeduid. Dat zij dezen afgeronden vorm aan de afslijtende werking van het water te danken hebben, bleek ons ook hier uit het uitsluitend voorkomen dezer ronde vuursteenen op het zeestrand.

De meeste vuursteenbrokken uit de moraine van de Gaasterlandsche kliffen zijn zwart van kleur en met de bekende witte verweeringskorst bedekt; sommige daarentegen bezitten een bruine of geele of ook wel grijze kleur. Vooral de licht gekleurde varieteiten zijn opgevuld met bryozoen (het rijkst aan deze overblijfselen was een okergeele vuursteen, overeenkomende met den door Gottsche²) beschreven okergeelen bryozoenvuursteen) en behalve deze organische overblijfselen vond ik in dit gesteente een schoonen afdruk van den steel eener *Pentacrinus Bronnii* Hag. — een soort, welke o. a. in het krijt van Rügen veelvuldig wordt aangetroffen —, een cidaritenstekel, overeenkomende met *Cidaris vesiculosus* Goldf. — eveneens uit het krijt van Rügen bekend — en een *Pecten* spec.

Wij zouden onvolledig, zijn, als wij ook de karakteristieke witgevlekte vuursteenen niet vermelden, die in talrijke brokstukken in de keimergel der Gaasterlandsche kliffen begraven liggen, en die met de door Gottsche in Sleeswijk-Holstein en door Geinitz³) in Mecklenburg aange-

I) K. Martin, l.c. blz. 10.

²⁾ Die Sedimentärgeschiebe d. Prov. Schlesw. Holst., 1883, p. 46.

Die Kreide-geschiebe des Mecklenburgischen Diluviums (Zeitschr. d. Deutsch. geolog.
 Ges. Jahrg. 1888, p. 733).

troffen witgevlekte vuursteenen van het Christiaanstads-gebied in Schonen vergeleken kunnen worden. De witte vlekken van een dezer zwarte vuursteenen bleek uit een wit kiezelgesteente te bestaan bijna geheel opgebouwd uit de skeletnaalden van kiezelsponzen. Gaf deze vuursteen ons aanleiding, om het ontstaan van vuursteen uit sponsnaalden nog eens in herinnering te brengen, het vermoeden, dat brokstukken van het genoemde witte gesteente in de keimergel zouden voorkomen, bleek niet ongegrond te zijn. In de onmiddellijke nabijheid van bovengenoemden vuursteen en later ook in andere deelen van het Roode Klif trof ik het witte uit sponsnaalden opgebouwde kiezelgesteente aan en zelfs uit het Mirdumer Klif werden door mij enkele brokstukjes er van te voorschijn gehaald.

Daar dit gesteente, voor zoover ik kon nagaan, nog niet uit ons diluvium was beschreven en eene nauwkeurige studie er van voor eene kennis van de transportrichting der gesteenten van gewicht zou kunnen zijn, zond ik eenige brokstukken aan den voortreffelijken kenner van fossiele sponsen, Dr. George Jennings Hinde, die de goedheid had, mij een uitvoerige studie er over toe te zenden. Uit zijne belangrijke mededeelingen, die eveneens in het tijdschrift der Belgische geologische vereeniging, als aanhangsel mijner verhandeling over de Gaasterlandsche klissen gepubliceerd zijn, leeren wij het groot aantal verschillende naaldvormen kennen, welke het materiaal tot de vorming van dit gesteente hebben geleverd, en ons vermoeden, dat het tot de bovensenone formatie behoort, is door Hinde's bepaling der sponsnaalden als bovensenone vormen bevestigd geworden. Daar nu in de bovensenone lagen van Denemarken en omliggende landstreken zulke sponsbeddingen hier en daar voorkomen, kan de herkomst van het witte kiezelgesteente uit bovengenoemd gebied met groote zekerheid worden aangenomen.

Doch de keimergel sluit nog een ander krijtgesteente in, dat wij hier niet met stilzwijgen voorbij mogen gaan. Den opmerkzamen bezoeker van het Roode Klif (in het Mirdumer Klif schijnt het te ontbreken) vallen bij het doorzoeken van de, op het strand verspreid liggende steenen, dadelijk 3-8 cM. groote, doorgaans platte kalksteenbrokken in het oog, wier helderwitte oppervlakte van knolvormige uitwassen voorzien is en aan de vingers afgeeft. Wanneer men deze stukken doorslaat, blijkt het echter, dat het gesteente de hier genoemde eigenschappen aan een verweeringsproces te danken heeft en dat het een geelachtig witte, somtijds ook wel lichtgrijze uiterst harde, dichte kalksteen is, waarin hier en daar een scherpkantig vuursteenbrokje is ingesloten. Behalve een klein fragment van een bivalve (wellicht van een Inoceramus spec.), heb ik in

de talrijke door mij onderzochte brokken geen enkel organisch overblijfsel kunnen ontdekken.

Kan er dus niet aan getwijfeld worden, dat wij hier met een krijtgesteente te doen hebben, minder gemakkelijk is het, de geologische étage en de herkomst nauwkeurig vast te stellen. Het eenige gesteente, dat ik volgens de beschrijving, die Roemer¹) en Gottsche²) er van geven, met onzen kalksteen kon gelijkstellen, is de Saltholmskalk, een op de Deensche eilanden Saltholm en Amagar ontwikkelde kalksteen. Daar echter de verschillende kalksteenvariëteiten moeielijk op zoodanige wijze kunnen beschreven worden, dat men hen dadelijk herkennen kan, zond ik het bewuste gesteente aan Prof. B. Lundgren te Lund in Zuid-Zweden, die van de krijtformatie zijns vaderlands eene speciale studie heeft gemaakt³) en die de vriendelijkheid had, mij mede te deelen, dat de witte kalksteen volgens zijne meening geen Saltholmskalk is en dat hem in Zweden geen enkel krijtgesteente bekend is, hetwelk er geheel mede overeenstemt.

De herkomst van dezen witten kalksteen, die, voor zoover ik weet, nog niet in het diluvium van ons land werd aangetroffen, ligt dus nog in het duister. Laat ons hopen, dat een ander in het opsporen er van gelukkiger zal zijn!

Kunnen nu de hier genoemde gesteenten ook eenig licht verspreiden omtrent de vraag naar den ouderdom der morainevorming aan de zuidkust van Friesland? Het is den lezer reeds uit de verhandeling van Prof. Martin gebleken, van hoe groot belang de oplossing van het vraagstuk van het al of niet bestaan in ons land van een bovenste keimergel voor de kennis van het Nederlandsch diluvium is. Hoewel het laatste wegens de afwezigheid in de streken, die aan de hand der landijs-theorie onderzocht zijn, van twee morainen boven elkander en gescheiden door interglaciale lagen, veel waarschijnlijker is, een direct bewijs is nog niet gegeven, doch zou, naar het oordeel van Martin, wellicht door een nauwkeurige studie der in beide keimergels ingesloten gesteenten kunnen geleverd worden. 4)

¹⁾ Ferdinand Roemer, Lethaea erratica.

²⁾ l. c.

³⁾ Oefversigt af Sveriges Mesozoiska Bildningar (Ur Lunds Universitets *Arsskrift, Tom. XXIV) Lund 1888.

⁴⁾ l. c. blz. 20. Nadat ik dit opstel had afgesloten, verscheen van de hand van Prof. F. P. J. van Calker eene verhandeling over de gekneusde steenen (Zeitschr. d. Deutsch. geolog. Ges. 1889, p. 343), waarin ook deze vraag besproken wordt.

Wat leeren ons nu de gesteenten uit de keimergel der Gaasterlandsche kliffen hieromtrent? Zeker niet veel. Het bleek toch, dat zoowel van uit de Russische Oostzee-provinciën als van uit Zweden en de Deensche eilanden in denzelfden tijd materiaal hierheen is gevoerd en de gesteenten, wier herkomst met vrij groote zekerheid kon worden vastgesteld, behoorden allen tot die steensoorten, die evengoed gedurende de eerste als gedurende de tweede ijsbedekking tot ons kunnen gekomen zijn: de Skolithen-zandsteen moet volgens Roemer meer bepaaldelijk uit Zuid-Zweden worden afgeleid; als het oorsprongsgebied der Beyrichien-kalken moet, gelijk den lezer reeds bekend is, vermoedelijk een tegenwoordig door de zee bedekte streek tusschen Oesel en Schonen worden aangenomen, terwijl eindelijk de krijtgesteenten uit de omgeving van Rügen, uit de Deensche eilanden en gedeeltelijk ook uit een klein gebied in het zuid-westen van Zweden afkomstig moesten verklaard worden. Brengen dus de door ons verzamelde gesteenten ons niet veel verder bij de beantwoording der door ons gestelde vrang, toch kunnen wij eenige verschijnselen vermelden, welke ons de keimergel van Friesland overal als die van de eerste ijsbedekking doen beschouwen. Toen ik nl. ongeveer twee jaren geleden, naar aanleiding der vier door mij in dit tijdschrift beschreven putboringen, een kort bezoek aan het Roode Klif bracht en daar een keimergel aantrof, die met die uit den ondergrond van Friesland (Sneek, Grouw, Leeuwarden en Oenkerk) zeer groote verschillen vertoonde, was ik zeer geneigd, deze verschillen aan een verschillenden ouderdom toe te schrijven: vooral het verschil in kleur scheen mij voor deze meening te pleiten, daar ook in Noord-Duitschland de bovenste keimergel doorgaans geelachtig grijs, de onderste daarentegen veel donkerder, doorgaans blauwgrijs van kleur is 1). Een nauwkeuriger onderzoek leerde echter, dat deze verschillen slechts schijnbaar bestaan: de geele, op sommige plekken zelfs geelroode kleur immers, die de keimergel van de Gaasterlandsche kliffen bezit, bleek ons slechts het gevolg van een oxydatieproces te zijn, waaraan de aan de oppervlakte liggende moraine langen tijd is blootgesteld geweest (blz. 786) en evenmin hebben wij ten opzichte der gesteenten belangrijke verschillen kunnen ontdekken: de morainevorming van het Roode en Mirdumer Klif bleek bij latere bezoeken even rijk te zijn aan bovensilurische

¹⁾ Later is men ook in Noord-Duitschland overeengekomen, de kleur van een keimergel niet meer als eene eigenschap te beschouwen, waaruit men tot haren ouderdom besluiten mag. (Zie o. a. G. Berendt und F. Wahnschaffe: Ergebnisse eines geologischen Ausfluges durch die Uckermark und Mecklenburg-Strelitz (Jahrb. K. Pr. geol. Landesanstalt f. 1887, 363—371. Mit Tab. XV).

kalken, als die in den ondergrond van Friesland 1) en het heeft ons zelfs getroffen, dat deze kalken ook bij de keimergel van Sneek, welke van de vier punten van Friesland, van waar wij deze vorming onderzochten, op den kortsten afstand van het Roode Klif gelegen is, en van welke wij een aantal uit verschillende diepten afkomstige grondproeven konden onderzoeken, slechts in de onderste deelen liggen ingesloten.

Moeten wij dus voor de moraine der Gaasterlandsche kliffen en voor die uit den ondergrond van Friesland een zelfden ouderdom aannemen, dan is ook tevens de onderdiluviale ouderdom van die aan Friesland's zuidkust vastgesteld, daar die welke te Sneek in den ondergrond ontwikkeld is, wegens hare ligging op Rijngrint als de keimergel van de eerste ijsbedekking moet beschouwd worden ²).

Pleit ook hetgeen Martin (l. c. blz. 14), naar aanleiding der bruinkoolbrokjes in de onderste deelen der Urksche keimergel, over den ouderdom dezer vorming zegt (welke met die van de Gaasterlandsche kliffen een zóó groote overeenkomst blijkt te bezitten) voor onze meening, het belangrijk niveau-verschil, dat er tusschen de morainevorming op laatstgenoemde plaatsen en die in den ondergrond van Sneek bestaat (±25 M.) zou wellicht sommigen er toe doen overhellen, aan de keimergel van Friesland's zuidkust een bovendiluvialen ouderdom toe te kennen. Eene nadere beschouwing leert echter, dat ook dit verschijnsel geen hinderpaal is, om de hier verkondigde meening aan te nemen.

Uit het onderzoek der Sneeker putboring is ons nl. gebleken, dat in de diluviale periode in deze provincie belangrijke niveau-veranderingen hebben plaatsgegrepen: vóór of na het einde ³) toch van het praeglaciale tijdvak heeft de bodem te Sneek eene belangrijke daling ondergaan, waardoor zich een ondiepe zeeboezem vormde, welke zich langzamerhand zoodanig met zand, grint en leem vulde, dat zich een machtige zandformatie ontwikkelde, waarop het naderende landijs zijne grondmoraine kon afzetten. Dat echter vóór den aankomst der gletschers niet geheel Friesland onder het zeeoppervlak bedolven lag, leerde ons reeds de 40 M. diepe boring, door den Ingenieur H. P. N. Halbertsma te Oenkerk

¹⁾ Zie: Bijdrage tot de kennis van Frieslands bodem I, l.c.

²⁾ Omtrent dit punt zijn Prof. Martin en Dr. Lorié het onderling eens. (Martin, l. c. p. 20, onderaan).

³⁾ Of men het eerste, dan wel het tweede wil aannemen, hangt slechts af van de bepaling der zandformatie onder Sneek als eene nog tot het praeglaciaal behoorende vorming (Lorié) of als eene afzetting, die in het begin van het glaciale tijdperk gevormd is (van Cappelle).

verricht, waar op een diepte van 2,20—5 M. een keimergel ligt, welke tot in de kleinste bijzonderheden met die onder Sneek overeenstemt ¹) en die op een 35 M. dikke, in zoetwater afgezette, zandvorming rust, welke zonder eenigen twijfel met de zandformatie onder Sneek moet gelijk gesteld worden.

Wanneer wij nu de dieptegrenzen onder A. P. der beide genoemde keimergels met elkander vergelijken:

dan verhindert het belangrijk niveauverschil, dat er tusschen de keimergel van de Gaasterlandsche kliffen en die onder Sneek bestaat, ons niet meer, aan de moraine aan Friesland's zuidkust en aan die uit den ondergrond van Sneek een gelijken ouderdom toe te kennen. Wij weten trouwens dat vrij aanzienlijke hoogteverschillen het zoogenaamde morainelandschap kenmerken.

Welke eigenschappen bezit nu de grond, waarop de keimergel in het kleine door ons onderzochte gebied rust? Het was deze vraag, die ik mij, ook met het oog op de mededeelingen van den Hoogleeraar Martin omtrent de bruinkoolbrokjes in de onderste deelen der Urker keimergel in de tweede plaats gesteld had. Deden mij nu de zooeven genoemde verschillen, welke de te Sneek en te Oenkerk onder de keimergel liggende glaciale afzettingen vertoonen, in verband met het vrij aanzienlijk niveanverschil dezer twee plaatsen, onder de morainevorming van het Roode Klif reeds een in zoetwater gevormd glaciaal gelaagd diluvium vermoeden, een 4 M. diepe boring (boring I, zie de figuur op blz. 798), door mij aan den voet van het klif verricht, bevestigde dit vermoeden.

Het onderzoek der grondsoorten, welke met een gewone lepelboor tekens om de 28 cM. naar boven werden gehaald, leerde nl. dat de keimergel bijna ongemerkt in een gelaagde zandvorming overgaat, die wegens de veldspaathkorrels, die er mede gemengd zijn en wegens de brokjes van verschillende Skandinaafsche gesteenten, welke zij bevat, als eene afzetting der gletscherbeken moet beschouwd worden. Dat de uit de naderende ijsmassa vloeiende stroomen het steengruis, waarmede zij beladen waren, niet in een zeeboezem, gelijk te Sneek, hebben uitgestort, doch evenals te Oenkerk over het land, bleek behalve uit het gemis van zeeorganismen in de zandvorming onder het Roode Klif, vooral uit de overblijfselen van gramineën (blad- en stengelfragmenten, talrijke geIsoleerde

¹⁾ l. c. blz. 174.

kelkkafjes en zelfs een geheel aartje) die uit de diepste, door de boor bereikte lagen te voorschijn kwamen.

Ten opzichte der elementen, waaruit dit glaciaal gelaagd zand is opgebouwd, zij nog opgemerkt, dat ook hier evenals te Sneek 1), de zandkorrels en de grootere steenbrokjes van boven naar beneden langzaam kleiner worden en den hoekigen vorm, die hen onmiddellijk onder het leem nog eigen is, meer en meer verliezen — een verschijnsel dat aan geen andere oorzaak kan worden toegeschreven, dan aan den verschillenden afstand, waarop het zand van den rand van het landijs werd afgezet.

Blijkt het dus, dat de afzettingen van de, uit het naderende landijs ontspringende, gletscherbeken een voornaam bestanddeel van Friesland's bodem uitmaken, ook tijdens het weder terugwijken van het landijs hebben de gletscherbeken uitgebreide zandafzettingen doen ontstaan en door hare erodeerende werking de configuratie des bodems in dit gedeelte van Friesland een belangrijke wijziging doen ondergaan.

Begrijpt de bezoeker van het Roode Klif dadelijk, dat de grond, waaruit deze hoogte gevormd is, zich onmogelijk alleen op dit kleine plekje kan gevormd hebben, hij twijfelt geen oogenblik meer aan de enorme erosie, waaraan de moraine in dit gebied blootgesteld is geweest, wanneer hij, den zeedijk in oostelijke richting volgende, op een vrij grooten afstand van het Roode Klif een tweede, hoewel minder aanzienlijke hoogte - het reeds genoemde Mirnser Klif - aantreft, die niet alleen aan de zeezijde doch ook aan de westzijde vrij steil is afgebroken en die eveneens uit de keimergel is opgebouwd. In het Roode Klif moet hij dan onmiddellijk een afgescheiden brokstuk van den diluvialen rug herkennen, die nog tot op grooten afstand in oostelijke richting - tot aan de dorpen Oude- en Nije-Mirdum - vervolgd kan worden. Deze rug, die zich wellicht nog verder naar het zuid-zuidoosten heeft uitgestrekt en waarvan misschien ook de Voorst - de reeds genoemde merkwaardige hoogte aan de Overijsselsche kust - een deel heeft uitgemaakt, zal, wegens zijne richting (van het N. N. W. naar het Z. Z. O.), loodrecht op de transportrichting der steenen, als een gedurende een stilstand in den teruggang van het landijs sterk in dikte toegenomen grondmoraine — dus als eene front- of eindmoraine - moeten beschouwd worden, eene uitspraak, waarmede de groote dikte der moraine op een zóó hoog gelegen punt goed overeenstemt.

Dat de afscheiding van het Roode Klif niet door de zee kan zijn tot stand gebracht, gelijk een oppervlakkig waarnemer wegens de ligging

¹⁾ Zie ons vorig opstel, blz. 149 en de tweede noot op blz. 176.

Ė Ideale doorsnede door het Roode Klif

ERKLARING: d = postglaciale zandvorno = alluvium (zoeklei).

zou denken - doch aan de gletscherbeken tijdens het terugtrekken van het ijs moet worden toegeschreven, leerde eene boring aan den voet van de 200 M. lange, lande waarts gerichte zachtglooiend afloopende helling van het klif (boring III op ne vensgaande figuur), waarbij onder de alluviale zeeklei eene gelaagde zandvorming werd aangetroffen, die nog tot op een afstand van 28 M. van den rand van het klif vervolgd kon worden, en die als het uitspoelings-product der keimergel moet beschouwd worden: dit bleek toch niet alleen uit de overeenkomst, welke het zand vertoont met dat, hetwelk men door slibbing van een brok keimergel verkrijgt, doch bovenal uit de talrijke sponsnaalden, die er op sommige diepten mede gemengd zijn en die met de naalden, waaruit het bovengenoemde, waarschijnlijk uit het krijt Denemarken afkomstige, kiezelge steente (blz. 792) is opgebouwd, volkomen identisch zijn.

dezer hoogte te midden van zeeklei allicht

In dit zand vermoedt de lezer dadelijk het zanddiluvium, dat overal in deze provincie onder de alluviale vormingen wordt aangetroffen en dat er zelden een grootere dikte dan 2 M. bereikt. Omtrent deze zandformatie, die de oppervlakte van het grootste deel onzer diluviale gronden vormt, zijn in de beide vorige jaargangen van dit tijdschrift door den Hoogleeraar Martin en Dr. Lorié 1) eenige mededeelingen gedaan. Terwijl Lorié zich de groote vlak-

1) Martin, l. c. blz. 36, Lorié, l. c. blz 452.

²⁾ Met het? in de moraine (c) hebben wij willen aanduiden, dat het verloop van de keimergel in noordelijke richting willekeurig moest worden aangenomen.

ten zanddiluvium, welke in de onmiddellijke nabijheid der groote rivieren (als de Rijn, de Maas en de IJsel) gelegen zijn, door deze groote stroomen gevormd denkt, wier transporteerend vermogen tijdens het terugtrekken van het landijs veel grooter moet zijn geweest 1), neemt Martin de hypothese van Berendt en Meyn over, die ons zanddiluvium met het "Haidesand" van Noord-Duitschland gelijk hebben gesteld en die het als eene vorming verklaard hebben, ontstaan door het smeltwater tijdens het terugwijken der gletschers. Later echter heeft ook Lorié, en wel uitsluitend voor onze noordelijke provinciën, aan laatstgenoemden factor een rol toegekend bij de vorming van het zanddiluvium 2), en ik geloof, dat, op die wijze uitgebreid, tegen zijne beschouwingen weinig in het midden kan gebracht worden. Daar groote rivieren in het gebied van het Skandinaafsch diluvium niet bestaan en daar onze noordelijke provinciën dichter bij het gletschercentrum gelegen waren, is het zeer waarschijnlijk, dat, terwijl de groote rivieren, tijdens het zich terugtrekken van het landijs, in het midden van ons land enorme hoeveelheden zand afzett'en, in het noorden daarentegen de smeltwateren hunnen invloed deden gelden. Reeds de veel geringere dikte, die het zanddiluvium in het laatstgenoemd gebied bezit, wijst op een verschil in vormingswijze.

Doch niet overal in het noorden bezit het zanddiluvium zulk een geringe dikte; op de landwaarts gerichte helling van het Roode Klif bijv. was de keimergel bij een boring, op een afstand van 28 M. van den bovenrand verricht (boring II op de meer gemelde figuur), nog op een diepte van 4 M. niet bereikt en dat eerstgenoemde vorming op deze plaats zelfs een nog grootere dikte bezit, leert eene beschouwing van het oostelijk gedeelte van het klif onmiddellijk. Hier toch zien wij dit zand den geheelen steilen wand dezer hoogte vormen en naar het westen toe discordant op de frontmoraine rusten; is de leek geneigd, dit gedeelte van het klif wegens de helm, waarmede het begroeid is en wegens de talrijke holen, die de konijnen er in hebben gegraven, voor een steil duin te verklaren, wanneer hij slechts de moeite neemt een enkelen blik te slaan in deze holen, laat hij deze meening wegens de laagsgewijze structuur, welke hij aanschouwt, onmiddellijk weder varen.

Niemand kan dus aan de enorme erosie, waaraan de frontmoraine aan

¹⁾ Lorié heeft deze meening breeder uitgewerkt in een opstel verschenen in het "Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie", 1888, p. 94—100.

²⁾ Eenige opmerkingen naar aanleiding van .het eiland Urk" (Tijdschr. v. h. Kon. Ned. Aardr. Gen. 1889, Versl. en Aardr. Meded., p. 45).

de zuidkust van Friesland is blootgesteld geweest, twijfelen; en daar de verspreiding van het zanddiluvium in dit gedeelte van ons vaderland niet aan een oude rivierbedding doet denken en de dikte dezer vorming in de onmiddellijke nabijheid van het Roode Klif te groot is (ten minste 10 M.) om de verklaring van Staring aan te nemen, en haar dus uitsluitend aan het van de hoogten afvloeiende regenwater toe te schrijven, zijn de smeltwateren van het zich terugtrekkende landijs het eenige middel, dat ons ter verklaring dezer dikke zandformatie overblijft.

Doch niet alleen aan het Roode, ook in de omgeving van het Mirnser en het Mirdumer Klif vallen de veranderingen, die in dit gebied tijdens de afsmelting van het ijs hebben plaats gegrepen, spoedig in het oog. Kan de steile wand, waarmede de eerstgenoemde hoogte zich aan de westzijde uit een uitgestrekte vlakte zanddiluvium verheft, slechts door heftige waterstroomen zijn tot stand gebracht, niet minder bij een bezoek aan het Mirdumer Klif leert men de belangrijke afspoeling kennen, die de moraine aan de zuidkust van Friesland heeft ondergaan. Wanneer wij bijv., na de om hun natuurschoon zoo hooggeroemde Gaasterlandsche heuvels in een noord-zuidelijke richting doorkruist te hebben en na de Steendollensvaart tot het einde toe gevolgd te hebben, onzen weg door het open veld voortzetten, dan bevinden wij ons spoedig aan den voet eener uitgestrekte grasvlakte, waarop hier en daar een boerenhofstede de eentonigheid eenigzins verbreekt en die tot aan den rand van het Mirdumer Klif langzaam oploopt. Hoe meer wij het klif naderen, hoe talrijker de steenen worden, die men op de velden verstrooid ziet liggen en zoo duidelijk als men maar verwachten kan, leeren wij hier de juistheid der meening van een van Duitschland's eerste diluviaal-geologen, Prof. Berendt, kennen, volgens welke de rolsteenbestrooiing, het rolsteenzand en het "Haidesand" (= Zanddiluvium) in denzelfden tijd ontstaan zijn en dus met elkander vereenigd moeten worden. De door de smeltwateren van het zich terugtrekkende landijs uit de frontmoraine uitgespoelde fijnere bestanddeelen toch werden naar de lagere streken gevoerd en deden hier het zanddiluvium ontstaan, dat de heuvels van het Gaasterland omgeeft, terwijl de grootere steenbrokken op de hoogten achterbleven en uit de keimergel zich hier en daar een rolsteenzand ontwikkelde: het oostelijk einde bijv. van den naar de zee toegekeerden, vertikalen wand der frontmoraine van het Roode Klif, waartegen de zooeven genoemde 10 M. dikke zandvormig aanligt, bestaat niet meer uit de keimergel, doch is in een rolsteenzand veranderd, dat naar het westen toe langzamerhand in het harde leem van het klif overgaat.

Zien wij in deze streek dus eene herhaling van hetgeen in Noord-duitschland in het groot wordt waargenomen, ook de met water gevulde, vrij steil glooiende grootere en kleinere kommen, die op verscheidene punten der plateaus ("Seenplatten") van laatstgenoemd gebied verspreid zijn, en wier ontstaan aan de uitschurende werking van het nederstortende smeltwater wordt toegeschreven, ontbreken niet. Als zoodanig hebben wij tenminste de dikwijls volkomen ronde, vrij diepe plassen van 5—10 M. middellijn beschouwd, die op de met gras bedekte, zacht glooiend afloopende helling van het Mirdumer Klif, niet ver van den rand, worden aangetroffen en die bij de bewoners dezer streek als een vreemdsoortig en onverklaarbaar verschijnsel bekend staan.

Hoewel het ons dus gebleken is, dat de afscheiding van het Roode Klif van het overige deel der frontmoraine niet door de zee tot stand is gebracht, doch aan de smeltwateren van het zich terugtrekkende landijs moet worden toegeschreven, toch heeft deze glaciale vorming aan Friesland's zuidkust in een veel later tijd aan de vernielende werking van het zeewater in geen geringe mate blootgestaan. De daling, die ons vaderland na de vorming van het zanddiluvium heeft ondergaan, is niet zoo groot geweest, dat de zee het Roode Klif bereiken kon, daar de oudere zeebezinkingen — o. a. gekenmerkt door de platte slijkmossel — in de onmiddellijke nabijheid dezer hoogte ontbreken. Eerst toen, nadat gedurende eene periode van rijzing de lage venen gevormd waren, welke in het zuidwesten van Friesland een groote oppervlakte bedekken en die zich tot op korten afstand van het klif onder de nieuwere zeebezinkingen uitstrekken (en niet tot aan den voet van dezen heuvel aan de oppervlakte liggen, zooals Staring op zijne geologische kaart van Nederland aangeeft) onze bodem andermaal eene daling onderging, drong de zee tot aan den voet van het Roode Klif door en veranderde dit toenmaals boven een uitgestrekt terrein zanddiluvium uitstekend brokstuk der frontmoraine in een onbeduidenden heuvel, die aan alle zijden door het water was ingesloten.

De klei, welke zich toen vormde, is daar, waar zij op het veen rust—dus op eenigen afstand van het klif — blauw van kleur en bevat een aantal exemplaren van de gewone hartschelp (Cardium edule L.), terwijl zij meer nabij de oppervlakte en daar waar het zanddiluvium de onderlaag vormt door het groote ijzergehalte hier en daar rood gekleurd is. Tijdens de vorming dezer klei kan echter het Roode Klif niet sterk zijn afgenomen, daar voor het bezinken van klei een rustig water noodig is (dat deze klei op vele plaatsen aan den voet van het klif met zand en grint

gemengd is, is alleszins verklaarbaar). Toen echter de venen, die de Zuiderzee voor een groot deel opvulden, werden weggeslagen en de zee de Gaasterlandsche heuvels andermaal bereikt had, begon het vernielingswerk op nieuw en werd de frontmoraine aan de zuidzijde nog verder weggespoeld, totdat de mensch door het aanleggen van paalwerk een verdere verwoesting verhinderde.

Hier zijn wij dus aan het einde onzer korte schets van de geologische geschiedenis der Gaasterlandsche kliffen. Ook den Nederlandschen lezer heb ik gemeend niet onkundig te mogen laten van de resultaten, welke het onderzoek van de grondgesteldheid van een belangrijk deel van Friesland's zuidkust heeft opgeleverd. Is het zelfs mogelijk geweest, op het in een geologisch opzicht meest vermaarde plekje dezer provincie nog nieuwe feiten aan het licht te brengen, dan zullen geologische onderzoekingen op andere minder bekende plaatsen van het Friesch diluvium voorzeker niet minder belangrijke uitkomsten opleveren.

Zij, die nog willen beweren, dat de Nederlandsche bodem niemands belangstelling kan opwekken en tot eigen waarnemingen zeer weinig geschikt is en die de vervaardiging eener verbeterde geologische kaart van ons land nog overbodig achten, hebben zeker geen kennis genomen van hetgeen er in den laatsten tijd in dit tijdschrift en elders over onzen bodem gepubliceerd is!

Sneek, Januari 1890.

Nederlands gemeenten boven 10,000 inwoners naar rangorde der bevolking op 1 Januari 1890, met opgave van de absolute en de percentsgewijze toeneming gedurende het jaar 1889 en gedurende het tijdperk van 1 Januari 1885 tot 1 Januari 1890.

N°.	NAAM.	Bevolking.	Toeneming	in 1889.	Toeneming 1	885/1889.
Nº.	NAAM.	Bevolking.	Absolute.	%.	Absolute.	%.
I	Amsterdam	406,316	6,892	1,7	39,656	10,8
2	Rotterdam	203,472	5,750	2,9	20,697 1)	11,3
3	's-Gravenhage	156,497	3,057	2,0	21,945	16,3
4	Utrecht	85,253	1,949	2,3	9,353	12,3
5	Groningen	55,215	883	1,6	4,587	9,1
6	Haarlem	52,155	1,181	2,3	6,536	14,3
7	Arnhem	49,998	993	2,0	4,626	10,2
8	Leiden	46,329	—50	0,1	2,507	5,7
9	Tilburg	33,795	618	1,9	2,891	9,4
10	Maastricht	32,681	647	2,0	2,756	9,2
11	Dordrecht	32,428	699	2,2	3,214	11,0
12	Nijmegen	32,326	584	1,8	3,533	12,3
13	Leeuwarden	30,149	432 2)	1,5	994	3,4
14	Delft	28,537	540	1,9	1,296	4,8
15	's-Hertogenbosch.	27,076	333	1,2	1,356	5,3
16	Zwolle	26,220	306	1,2	1,899	7,8
17	Schiedam	25,620	192	0,8	1,117	4,6
18	Nieuwer-Amstel .	24,902	1,279	5,4	3,601	16,9
19	Deventer	23,220	301	1,3	1,685	7,8
20	Helder	22,985	269	1,2	2,443	11,9
21	Breda	21,967	632	3,0	2,501	12,8
22	Gouda	19,833	25	0,1	673	3,5
23	Apeldoorn	19,190	507	2,7	2,297	13,6
24	Kampen	18,678	 —8 9	0,5	390	2,1

Bij Rotterdams bevolkingscijfer in 1885 (169,477) dient dat van Delfshaven gevoegd (18,298). [Zie T. N. A. G. Dl. IV, N°. 5/6, pag. 380].

²⁾ Leeuwardens bevolkingscijfer 1 Januari 1888 [T. N. A. G. Dl. VI, N°. 8/10, pag. 487] moet zijn: 29,717.

N°.	NAAM.	Baralkia	Toenemin	g in 1889.	Toeneming 1	885 _/ 1889.
	NAAM.	Bevolking.	Absolute.	°/ ₀ .	Absolute.	°/₀.
25	Zutphen	17,200	196	1,2	1,234	7,7
26	Middelburg	17,109	366	2,2	819	5,0
27	Kralingen	17,095	1,394	8,9	4,454	35,2
28	Alkmaar	15,833	333	2,1	1,255	8,6
29	Amersfoort	15,694	450	3,0	840	5,7
30	Weststellingwerf.	15,450	86	0,6	763	5,2
31	Zaandam	15,341	335	2,2	1,483	10,7
32	Haarlemmermeer.	15,301	167	1,1	918	6,4
33	Enschedé	15,202	481	3,3	2,502	19,7
34	Opsterland	15,009	19	0,1	344	2,3
35	Emmen	14,277	837	6,2	2,745	23,8
36	Schoterland	14,197	, 91	0,6	643	4,7
37	Tietjerksteradeel.	14,159	14	0,1	556	4,1
38	Rheden	13,785	115	0,8	924	7,2
39	Vlissingen	13,538	745	5,8	1,980	17,1
40	Ede	13,130	217	1,7	1,028	8,5
41	Wonseradeel	13,011	—35	-0,3	82	0,6
42	Hilversum	12,615	416	3,4	1,482	13,3
43	Vlaardingen	12,609	310	2,5	1,647	15,0
44	Bergen-op-Zoom .	12,477	254	2,1	1,154	10,2
45	Wymbritseradeel.	12,273	143	1,2	419	3,5
46	Roermond	12,039	107	0,9	892	8,0
47	Gorinchem	11,892	108	0,9	1,250	11,8
48	Hoogeveen	11,703	-67	-0,6	85	0,7
49	Sneek	11,465	99	0,9	428	3,9
50	Rosendaal	11,446	472	4,3	1,713 1)	17,6
51	Venlo	11,334	218	2,0	1,508 2)	15,35
52	Hoorn	11,218	93	0,8	272	2,5
53	Achtkarspelen	11,008	90	0,8	556	5.3
54	Oosterhout	10,911	54	0.5	375	3,6
55	Veendam	10,709	-3	-0,03	159	1,5
56	Dantumadeel	10,708	68	0,6	529	5,2

¹⁾ Rosendaal 1 Jan. '85: 9,783.

²⁾ Venlo 1 Jan. '85: 9,826.

N°.	NAAM.	Bevolking.	Toeneming	in 1839.	Toeneming 1	885 _/ 1889.
N°.	NAAM.	Devoiking.	Absolute.	°/°·	Absolute.	%.
57	Menaldumadeel .	10,548	-195	—r,8	20	0,2
58	Harlingen	10,342	68	0,7	74	0,7
59	Slochteren	10,310	116	1,1	4261)	4,3
60	Smallingerland	10,201	34	0,3	4102)	4,2
61	Hengelo	10,192	335³)	3,4	Ca 1,4504)	{ 16,5 à 17,0
62	Sliedrecht	10,189	56	0,55	684 ⁵)	7,2
	Te zamen	1,966,362	36,331	1,9	180,656	10,1

De totale bevolking van Nederland nam in 1889 toe van 4,505,932 tot 4,548,596 dus met 42,664 inwoners, d. i. 0,95%. De gemiddelde toeneming der bevolking bedroeg dus maar de helft van de gemiddelde vermeerdering in de hierboven genoemde groote gemeenten. De bevolking in de hier niet genoemde kleinere gemeenten (waarin geen groote bevolkingscentra liggen) nam dan ook maar toe van 2,575,901 tot 2,582,234, dus met 6,333 zielen of 0,25%. Veel sterker dus weer dan de vorige jaren blijkt de aantrekkingskracht der groote centra van bevolking - over 't algemeen kan men dit ook opmaken bij 't nagaan der hiervoorgaande lijst: de toenemingscijfers der plattelandsgemeenten slaan meestal een treurig figuur naast die der steden en de weinige uitzonderingen daarop zijn licht te verklaren of hebben een geheel tijdelijk karakter. Zoo blijkt bijv. uit de absolute toeneming in 1889 dat na de 4 grootste steden alleen Kralingen, Nieuwer-Amstel en Haarlem meer dan 1000 zielen toenamen: deze groote aanwas van Kralingen en Nieuwer-Amstel (8,9 en $5.4^{\circ}/_{0}$) is echter geheel te wijten aan 't feit, dat deze twee grootendeels als voorsteden van Rotterdam en Amsterdam zijn te beschouwen. Naast deze twee hooge percentage-cijfers valt ook de snelle aanwas op van

¹⁾ Slochteren 1 Jan. '85: 9,884.

²⁾ Smallingerland 1 Jan. '85: 9,791.

³⁾ Hengelo 1 Jan. '89: 9,857.

⁴⁾ I Jan. '85 heeft het 8,447, maar in '86 krijgt het circa 300 van Weerselo.

⁵⁾ Sliedrecht 1 Jan. '85: 9,505.

Emmen $(6,2^0/_0)$ dat nog steeds door zijne veenkoloniën nieuwe bevolking blijft trekken — verder vermeerderden in '89 ook aanmerkelijk: Vlissingen (5,8), Rosendaal (4,3), Hilversum en Hengelo (3,4), Enschedé (3,3), Breda en Amersfoort $(3^0/_0)$. Daartegenover staan ook gemeenten die in 1889 achteruit gingen: Menaldumadeel (met $1,8^0/_0$!), Hoorn (0,8), Hoogeveen (0,6), Kampen (0,5), Wonseradeel (0,3), Leiden (0,1), Veendam (0,03) of bijna niet toenamen: Gouda, Opsterland en Tietjerksteradeel (allen $0,1^0/_0$ aanwas).

Hiervan geldt echter evenzeer als van de gemeenten met grooten aanwas, dat eerst eene af- of toeneming gedurende eenige jaren van beteekenis wordt voor eene plaats (zie T. N. A. G. Verslagen en Mededeelingen Dl. IV, 5 en 6, pag. 330, Dl. V, 5 en 6, pag. 370, Dl. VI, 8—10, pag. 487); toeneming, gevolgd door stilstand of achteruitgang, of omgekeerd, behoort niet tot de zeldzaamheden (hier zij bijv. genoemd Amersfoort en Hoorn) en zoo iets kan tot verkeerde gevolgtrekkingen aanleiding geven als men zich alleen baseert op de resultaten van één jaar.

In dat opzicht geven de twee laatste kolommen in bovenstaande lijst meer zekerheid. Reeds een oppervlakkige blik over de lijst der absolute toeneming in die 5 jaren 1885-1889 verraadt groote onregelmatigheden in den aanwas: men vergelijke bijv. eens: Nijmegen en Leeuwarden, Schiedam en Nieuwer-Amstel, Breda en Gouda, Apeldoorn en Kampen, Middelburg en Kralingen, Enschedé en Opsterland, Emmen en Schoterland, Rheden en Vlissingen, Wonseradeel en Hilversum, Gorinchem en Hoogeveen, Sneek en Rosendaal, Venlo en Hoorn, Dantumadeel en Menaldumadeel, Smallingerland en Hengelo! Uit de percenten-cijfers blijkt, dat naast Kralingen (35,20/0) vooral eene groote toeneming plaats vond te Emmen (23,8), Enschedé (19,7), Rosendaal (17,6), Vlissingen (17,1), Hengelo, Nieuwer-Amstel, 's Gravenhage, Venlo en Vlaardingen (allen 17 à $15^{0}/_{0}$) — allen plaatsen met handel of industrie of eene hoogst gunstige ligging, terwijl Nieuwer-Amstel en Kralingen optreden als de vertegenwoordigers van onze 2 grootste steden die, minder gelukkig dan den Haag, zich niet behoorlijk kunnen uitbreiden binnen hunne enge grenzen.

In tegenstelling met deze gemeenten blijken anderen in bovenstaande lijst in een stadium van stilstand of achteruitgang van bevolking te verkeeren. De bevolking van ons geheele land nam van 1885 tot 1890 toe van 4,278,000 tot 4,548,600, dus met 270,600 zielen of met 6,3%. De 62 bovengenoemde gemeenten die 1 Januari 1890 samen 1,966,362 in

woners telden, hadden 1 Januari 1885: 1,785,706, zij namen dus met 180,656 of 10,1% toe, terwijl de overigen van 2,492,294 stegen tot 2,582,234, dus vermeerderden met 89,940 of 3,6%. Gemeenten die beneden deze gemiddelde vermeerdering bleven, gingen dus tegenover hunne omgeving achteruit sinds 1885, zelfs al bestond die omgeving uit kleine plattelandsgemeenten. Onder de hierboven genoemde gemeenten behooren de volgende tot deze categorie: Menaldumadeel (aanwas 0,2%), Wonseradeel (0,6), Hoogeveen en Harlingen (0,7), Veendam (1,5), Kampen, Opsterland en Hoorn (2,1 à 2,5), Leeuwarden, Gouda en Wymbritseradeel (3,4 en 3,5). Gedeeltelijk zijn dit juist groote plattelandsgemeenten zonder groote bevolkingscentra (die dus in de zelfde omstandigheden verkeeren als de meeste kleinere gemeenten), overigens zijn het ôf landbouwsteden ôf — merkwaardig genoeg! — handelssteden aan de Zuiderzee.

Met kleine uitzonderingen bevestigt dus ook dit kleine statistisch overzicht weer de feiten: 1°. dat de toeneming in bevolking in landbouwstreken langzamer, in handel- en industriestreken sneller plaats vindt; 2°. dat de groote centra van bevolking 't sterkst aanwassen en 3°. dat de bevolkingstoeneming der groote steden aan de buitenranden plaats grijpt — iets wat ten zeerste dient te worden overwogen bij wijziging van gemeentegrenzen en bij de splitsing van groote steden in enkelvoudige kiesdistricten.

Apeldoorn, 6 Juli 1890.

J. F. HOEKSTRA Jzn.

DE BODEM VAN NEDERLAND.

DOOR

J. KUYPER.

Een hoogstbelangrijke arbeid werd in 1889 beeindigd; hij vorderde tien jaren en toch moet men erkennen de tijd niet is misbruikt, want het werk was veelomvattend en buitengemeen lastig; het betrof de kadastrale herziening der vier en een half millioen perceelen, waarin de oppervlakte van Nederland is verdeeld.

Dat zulk eene herziening uit een billijkheids oogpunt noodig was, blijkt duidelijk uit het feit dat Regeering en Vertegenwoordiging er tonnen gouds voor over hadden om die zaak goed aan te vatten en goed te beeindigen. Gelukkig was de Secretaris, dien het leeuwenaandeel in de uitvoering ten deel viel, de Heer W. v. Konijnenburg, ten volke vertrouwd met het onderwerp, en aan hem danken wij thans de uitvoerige, met tal van tabellen en graphische voorstellingen opgehelderde verslagen van de Hoofd-Commissie voor de Herziening der ongebouwde eigendommen; de gebouwde eigendommen waren reeds voor een twaalftal jaren herschat.

Veel moeilijker was intusschen deze herziening, en veel belangrijker tevens voor de kennis van ons Vaderland en ieder die de beide dikke en groote quarto's ter hand neemt, zal aangenaam verrast zijn dat een maatregel uitsluitend genomen uit een administratief oogpunt, zulke duidelijke blikken doet slaan in 's lands toestand.

Daar de geograaf in de allereerste plaats den grond van zijn vaderland dient te kennen, en deze arbeid daartoe vele schreden nader voert, hebben wij niet geschroomd eenige moeite te nemen en aan den belangstellenden lezer, zoo beknopt mogelijk, enkele belangrijke resultaten voor te leggen.

Het geheele land werd verdeeld in 35 schattingdistrikten (van 2 tot 5 in de verschillende provinciën) en deze weder in 147 onderdeelen. In ieder schattingdistrikt werd eene Commissie benoemd, bestaande uit een

Voorzitter en voor elk onderdeel 3 leden en een plaatsvervanger; deze verrichtten het veelomvattend werk, onder toezicht van eene Hoofdcommissie in iedere provincie, bestaande uit een lid en een plaatsvervanger.

De schatting geschiedde overal naar de zuivere pachtwaarde, dus na aftrek van de polderlasten, en om hierin over het geheele land overeenstemming te krijgen was veel voorbereiding en niet minder overleg noodig; men maakte zich bekend met de huurkontrakten over 163,131 perceelen, begrepen in 25,164 overeenkomsten. Zij strekken tot toets voor het richtige van den arbeid, terwijl de opbrengst van ruim 92,000 perceelen, welke als type moesten dienen, werd vastgesteld; zoo trachtte men — met bevredigenden uitslag — over het gansche land de gewenschte overeenstemming tot stand te brengen, daar deze voorheen vrij wat te wenschen overliet en sommige gewesten terecht over ongelijk hooge waardeschatting klaagden.

Voor ons doel zijn de regelingen, welke zijn getroffen ter bereiking eener billijke verdeeling der lasten, niet te onderzoeken; wij wenschen slechts in algemeene trekken te schetsen welke waarde aan den bodem van ons land is toe te kennen, hoe de uitnemende, goede, tamelijke en weinig productieve gronden zich over de verschillende gewesten verdeelen en welke de verhouding der onderscheiden kulturen is; daaruit leeren wij de belangrijkheid van elke provincie overzien, en wie nog verder wil gaan dien verwijzen wij naar de uitvoerige verslagen zelve, waar degeen die voor geographie en landhuishoudkunde belangstelling koestert, aan de hand van den kundigen samensteller, menig merkwaardig feit zal ontdekken. Alvorens verder te gaan willen wij toch nog opmerken, dat natuurlijk niet alle onderdeelen der distrikten even groot waren: Hoorn met 13,023 Hektaren, en Emmen met 45,210 H. A. vormen de uitersten, en het aantal te schatten perceelen liep nog meer uit een; wij merkten o. a. op: Beekbergen met 14,469 perceelen, daarentegen 's Gravenhage met 61,104, Sittard met 74,712 en Gorinchem met 76,405 perceelen.

Meestal bedroeg het aantal perceelen een vrij grooter cijfer dan dat der Hektaren, toch was dit soms kleiner, vooral in Groningen en Friesland, terwijl daarentegen het aantal perceelen dikwerf klom tot een veelvoud van het getal Hektaren, bijv: Utrecht bijna 2½, Amsterdam ruim 2½, 's Gravenhage, Schoonhoven en Maastricht ruim 3, Heerlen en Echt (in L.) bijna 4, en Sittard bijna 5 maal.

Ofschoon over het algemeen de grootte der perceelen eerder tegendan medevalt, mag men hieruit niet al te spoedig gevolgtrekkingen afleiden, daar dikwerf één eigenaar een aantal perceelen bezit.

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Het geheele Rijk levert het volgende resultaat op

PRO	ΟV	IN	CI	E.				HEKTAREN.	PERCEELEN.
Noordbrabant.	_	•			_		_	485,973	772,530
Gelderland								493,431	614,731
Zuid-Holland.								301,090	602,212
Noord-Holland								275,633	356,499
Zeeland								176,723	207,180
Utrecht								138,470	193,142
Friesland								330,687	326,942
Overijsel								331,938	443,240
Groningen								234,384	265,080
Drente			•					265,238	266,800
Limburg	•	•	•	•	•	•	•	220,260	531,054
Het Rijk	•		•	•	•	•	•	3,253,827	4,579,410

Tot de juiste bekendheid van ons Vaderland behoort in de eerste plaats de wetenschap tot welke doeleinden het land gebruikt wordt; de volgende tabel leert ons dien toestand op het einde van 1889 nauwkeurig kennen in aantal Hektaren.

												,
Totaal aantal Hec- taren.	485,973	493,431	301,090	275,633	176,723	138,470	330,687	331,938	234,384	265,238	220,260	3,253,827
Onbelast- Eigendom- bare gens vrij- dom van eigen- herziening vrijgesteld dommen. (*).	16,971	9,083	6,185	13,136	1,767	3,412	8,124	4,287	7,746	10,741	6,401	87,793
Onbelast- bare eigen- dommen.	4,058	6,445	13,301	12,067	3,557	2,679	18,179	9,830	3,511	3,913	10,003	80,543
Erven van ge- bouwen en lust- plaatsen.	5,990	5,393	6,485	4,781	2,708	3,157	4,478	2,837	3,363	8,477	8,098	48,982
Moeras vergraven grond, strandwa- ter, veld- en spoor- wegen.	18,789	10,219	14,677	18,764	7,255	9,257	14,260	14,055	7,079	5,330	8,341	181,966
Heide, veen- grond, duin en zand.	122,769	107,843	8,107	87,178	2,682	8,345	25,217	101,937	81,926	135,552	36,020	597,603
Rietland, kwelders, gorzen, schorren, slikken en griend.	6,943	2,073	6,313	1,625	7,488	1,691	2,840	8,922	5,343	2	166	37,404
Dennen- bosch.	30,496	23,636	214	74	73	6,875	383	6,828	119	8,194	21,365	92,256
Hakhout en opgaand loof hout.	14,319	43,664	7,904	7,045	1,419	8,526	6,825	9,930	790	5,445	12,416	118,283
Tuin, moestuin, land, boom- gaard, dijken bloemiste- rij & boom- rig & boom-	5,851	12,360	10,255	4,199	3,331	4,920	1,529	808'3	4,130	891	10,099	59,373
Wei- en hooiland, d. o. dijken enz.	120,932	153,302	161,274	148,323	39,762	69,438	198,982	184,999	61,699	65,207	23,962	1,167,880
Bouw-	145,658	119,413	66,375	38,441	106,688	90,170	49,870	59,065	118,678	33,488	86,398	847,844
PROVINCIE.	Noordbrabant	Gelderland	Zaid-Holland.	Noord- "	Zeeland	Utrecht	Friesland	Overijsel	Groningen	Drente	Limburg	Het Rijk , .

Dit overzicht is ongetwijfeld hoogst belangrijk al bevredigt het niet volkomen, daar de geograaf gaarne de uitgestrektheid der hooge en lage venen zou willen kennen; hier zijn ze geheel uit een fiskaal oogpunt gerekend onder de heidegronden, of onder de moerassen en vergraven gronden, of ook wel onder de weiden van de geringste kwaliteit, daar de veenbodem niet afzonderlijk is belast; de fiskus bepaalt zich tot eene waardeering der oppervlakte. Zoo is het ook jammer dat tuinbouw en boomgaarden onder ééne rubriek ressorteeren. In de voorlaatste kolom (*) zijn allerlei vroeger reeds vrijgestelde gronden begrepen en tevens in de veenpolders die perceelen, welke door verveening in waarde verminderd zijnde, toch krachtens reglementaire bepalingen voortdurend in de grondbelasting zijn aangeslagen.

De tabel verkrijgt groote waarde wanneer men de uitgestrektheid der gronden vergelijkt met de belastbare opbrengst; niet iedere kamp weiland, niet elke akker bouwland van dezelfde grootte brengt evenveel op; wij komen daar later op terug in de bijlagen I, II en III, maar willen al dadelijk de aandacht vestigen op onderstaanden vergelijkenden staat:

	Grootte	in	Geschatte was	erden in
RUBRIEKEN.	Hektaren.	Per- centen	Guldens.	Per- centen.
Bouwland	847,244	26	33,171,000	32,4
Wei- en hooilanden (dijken en bermen d. o. begrepen)	1,167,880	36	56,426,000	55,2
Tuinen, moestuinen, boomgaarden, bloemisterijen en boomkweekerijen	59,873	1,8	5,009,000	, ·
Bosschen (hakhout, opgaande boomen). Dennenbosschen	118,283 92,256	3,6 2,8	399,000	0,4
Griend, rijs- en twijgwaarden	8,410	0,3	1	0,4
Rietlanden, kwelders, gorzen, schorren, aanwassen of slikken	28,994	0,9	387,000	0,4
Heide, veengrond, duin en zand	597,603	18,4	547,000	0,5
Veld- en spoorwegen	29,337	0,9	565,000	0,6
Vergraven gronden, moerassen en water.	95,007	2,9	134,000	0,1
Erven van gebouwen en lustplaatsen.	42,982	1,3	3,365,000	3,3

Men ziet hieruit o. a. van welk overwegend belang onze weiden en hooilanden zijn, daar zij niet alleen $36^{\circ}/_{\circ}$ van het grondgebied beslaan,

maar 55,2%,0 van de geschatte waarde in het geheele Rijk uitmaken; ook de rubriek tuinen enz. trekt de aandacht, daar deze hoewel slechts 1,8% van de totale oppervlakte innemende wêl 5% van de waarde vertegenwoordigen. Welk verschil met de heide c. a., die tienmaal meer ruimte innemend, slechts één tiende dier opbrengst aan waarde opleveren.

De griend- en rijsgronden zijn bijzonder productief, daar zij evenveel waarde vertegenwoordigen als de elfmaal uitgestrekter dennenbosschen, die ook in dit opzicht verbazend ten achter staan bij de bosschen van loofhout en het hakhout.

De uitnemendste wei- en hooilanden vindt men hoofdzakelijk in den Beemster (N. H.), Wymbritseradeel (Fr.), Kampereiland en naburige Zuiderzeeboorden (Ov.), langs de Maas (NB. en L.), Eemland c. a. (U. & G.), tusschen Woerden & Leiden en zuidwaarts van Delft (Z. H.), benevens hier en daar in het Rijk kleinere oppervlakten.

Onder de uitstekendste bouwlanden noemen wij: de Dollardpolders (Gr.), de noordkust van Friesland, de zoogenaamde Langendijken benoorden Alkmaar, de Streek tusschen Hoorn en Enkhuizen (N. H.), ten westen van Leiden, en enkele kleinere bouwstreken.

De productiefste tuinen en boomgaarden c.a. vindt men in het Westland en in de noordelijke en oostelijke omgeving van 's Gravenhage, langs den oostvoet der duinen vooral nabij Haarlem, voorts in de Betuwe, enz.

Tot de heidestreken, welke op eene opbrengst van slechts f_4 .— en minder per Hektare zijn geschat behoort nog juist één vierde van de oppervlakte des Rijks; de Heide-maatschappij heeft dus wel reden van bestaan.

Dit overzicht besluiten wij met den wensch dat menigeen zich aangespoord zal gevoelen om kennis te maken het hoogst belangrijke, uitvoerige, officiëele verslag, dat verrijkt is met keurig uitgevoerde, aan duidelijkheid niets te wenschen overlatende graphische voorstellingen, en wij voegen hier een drietal bijlagen aan toe, welke den weetgierige stellig belangstelling zullen inboezemen

Den Haag, Juli 1890.

Bijlage I.

GESCHATTE WAARDE VAN DE GRONDEN IN DE VERSCHILLENDE PROVINCIEN VAN HET RIJK.

AANTAL HEKTAREN.

Limburg. Totaal.	645	8 88 8 80	906	519	137	78 1,003	106	7.0 4.00	30	35	1,780	1,100	471	316		2,400			287 5,701 5,488	_
Drente.			-																	
Gronin- gen.			1	178						į	47			-	2		32		92	1,886
Overijsel.				105	56		င္တ		7		48	90	•	4 c	R	19	85		88	408
Fries- land.								10			186	48		,	140		385		187	2,846
Utrecht.					81		8		88	1	54	92		9	AAT	64	741		100	1,518
Zeeland. Utrecht.																172	23	03	33	390
Noord- Holland.	545	13	215	œ	3	252		1 20	6	13	318	117	77	4 6	185	239	493		01 oc 02 oc	3,914
Zuid- Holland.			689	ארר	211	208		491			1,049	116	412	30	831	803	763		3006	1,612
Gelder- land.				236		75	94	0	1/3	28	145	47	4.5	181	150	505	404	_	1,318	3,182
Noord- brabant.		70	O4								4	78		8	66	319	429		788	1.1.2
Schaal van Schatting.	/ 450,—	\$50°,—	., 330,—	. 280,—	260.	., 250,—	240,—	, 230° 	., 220,-	., 210,—	— °200°	., 180,—	, 175,—	170,-	., 160,-	, 150,— 145,—	140,—	135.	., 180,—	1000

800	113.785	19,230	174,419	42,613	207,831	67,036	196,470	86,166	159,523	97.841	129,172	126,060	154,039	141.748	111,150	93,747	67,490	79,271	64,661	62,946	86,528	171,983	232,128	213,623	3,087,8701)	80,543		85,415	3,253,828	
360	1.315	1,187	2,398	1,954	3,643	8,747	6,486	8,696	11,738	11,016	10,983	10,690	11,515	11,543	10,078	8,405	7.220	8,612	6,566	8,571	8,095	12,392	27,514	1,091	203,855	10,003		6,401	220,259	•
:	145		377		407	79	546	466	1,991	3,596	6,917	11,244	13,463	13,808	13,481	12,866	10,730	9,679	6,317	1,741	3,751	4.690	49,664	84,588	250,584	3,913		10,741	865,238	-
8	7.086	2.047	95,654	2,853	24,440	3,220	84,147	9,635	18,654	10,772	10,977	9,655	10,490	6,570	5,468	5,385	2,010	3,741	1,098	1,647	396	1,932	21,239	8,077	223,127	3,510		7,746	234,383	
290	4.257	1.338	4,519	2,115	5,866	8,118	5,262	3,959	5,762	6,708	9,499	14,417	23,107	699.78	25,789	19,149	13,869	12,476	9,978	7,964	13,931	37,706	51,457	7,303	324,880	2,830		4,287	331,937	
	27.196	2016	32,892		89,478	23	19,691	3,950	16,934	13,781	16,799	14,398	15,078	12,383	9,168	8,287	3,901	5,124	2,254	4,711	1,387	11,443	7,907	13,732	304,384	18,179		8,184	330,687	_
-	4,728	î	10,710		18,033		20,797	840	14,358	2,600	7,349	3,638	5,242	4,283	3,120	3,647	2,483	4,065	8,457	3,650	3,134	3,799	891	5,589	132,380	8,679		3,412	138,471	-
98	1.631	3,777	7,508	13,045	21,742	23,667	27,071	20,156	14,673	7,092	3,814	2,956	2,368	1.047	1,116	486	857	1,231	1,985	581	2,650	989	603	8,589	171,399	3,557		1,767	176,723	•
360	22.506	734	22,725	1,993	21,774	5,317	19,336	6,766	14,860	5,765	7,427	4,845	5,765	3,758	2,314	4,384	2,067	3,422	1,876	3,016	2,155	6.304	399	32,349	852,8081)	18,067		10,758	275,633	•
1,163	28.374	7.038	38,633	14,369	38,933	12,779	29,211	7,960	19,389	2,886	9,758	978	3,158	1,007	395	1.310	831	1,546	2,381	2,174	446	1.298	777	11,789	\$81,604	13,301	,	6,185	301,090	_
580	10.124	363	15,772	1,474	25,412	6,155	25,279	11,508	22,134	13,823	17,949	23,258	32,507	33,286	22,834	17,333	14,447	18,350	17,089	16,680	31,608	56,661	8,475	12,670	477,903	6,445		9,082	493,430	
380	6.424	2,744	13,837	4,810	18,115	10,931	18,704	18,229	19,641	19,203	27,699	30,586	31,347	26,386	17,447	18,496	9,076	11,023	12,661	12,212	18,977	34,069	63,201	21,968	464,944	4,058		16,911	485,973	
200	 	75.	70,1	65,—	- °00°	. 55,	50,—	45,-	60+	35,—	30,-	. 85,	- 08	16,—	13,—	10,1	, %	9	4.	, es,	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		0,20	0,85	Belastbare eigendommen.	Onbelastbare eigendommen.		Eigendommen wegans vrij- dom niet herzien.	Totaal	

1) Hieronder 8,378 niet opnieuw geschatte Hektaren (Art. 2 der Wet).

belastbare Hektare) tot vijf groepen, ter verduidelijking van den toestand.

GROEPEN.	Noord- brabant.	Gelder- land.	Zuid- Holland.	Zuid- Noord- Holland. Holland.	Zeeland. Utrecht.	Utrecht.	Fries- land.	Overijsel.	Gronin- gen.	Drente.	Limburg.	Limburg. Het Rijk.
						никт	A B E N	τ.				
Waardo f 100.— on meer	5,739	16,078	26,637	30,705	1,295	5,585	17,199	3,592	4,575	38	2,212	113,761
Waarde f 50.— tot f 95.— (zeer goed).	78,983	91,280	186,888	.113,450	98,911	55,709	125,949	30,605	90,808	1,613	20,821	894,966
Waarde f 25.— tot f 45.—	109,358	88,669	40,965	38,463	48,691	28,785	65,869	40,345	59,693	24,214	53,122	598,162
Waardo f 10.— tot f 20.— (tamelijk).	87,676	105,960	5,870	16,921	5,017	16,392	44,916	95,654	97,913	53,618	41,541	500,678
	183,188	175,978	21,244	51,591	17,485	26,009	50,458	154,684	40,138	171,101	86,159	977,925
Totaal (zie Noot op Bijlage II).	464,940	464,940 477,903 281,604		250,430 en 2,378	171,399	132,380	171,399 139,380 304,384	324,880	223,127	250,584	203,855	3,085,498 en 2,378

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HET PLANTENKLEED VAN WESTERWOLDE IN VERBAND MET DE BODEMGESTELDHEID.

EENE AARDRIJKSKUNDIGE STUDIE IN HET VELD

DOOR

Dr. HOMMO TONKES.

"Het nauwkeurig bestudeeren van den bouwgrond of teelaarde behoort niet bij de aardkunde te huis, maar bij den landbouw. Alleen in zoover die den ondergrond onttrekt, komt hij bij den geoloog in aanmerking, maar terwijl de hand van den mensch over verreweg het grootste deel van Nederland gegaan is, zoo is het dan ook meestal noodig, dat het voortbrengsel van menschelijke vlijt, de bouwgrond, in gedachte moet worden weggeruimd, wanneer men den eigenlijken oorspronkelijken bodem te beschouwen heeft....

In zoover dus de bouwgrond den oorspronkelijken bodem aan het oog onttrekt, behoort hij tot het hier behandelde onderwerp. Want ten einde hem bij geologische nasporingen, gelijk noodzakelijk is, over het hoofd te zien, dient men hem eerst te leeren kennen en duidelijk te onderscheiden van den ondergrond. Het is toch die ondergrond, welks onderzoek het doel is van den aardkundige en welken hij ook alleen op de geologische kaarten aanduidt.... De geologische kaart vertoont de oppervlakte van den grond met betrekking tot de vormkracht, waardoor, en het tijdperk, waarin die grond ontstaan is. Agronomische kaarten toonen die oppervlakte met betrekking tot den toestand, waarin haar ôf de plantengroei alleen, ôf de menschelijke kunstvlijt in vereeniging met den plantengroei, gebracht heeft 1)."

Voor den geoloog is dus de humuskorst een hindernis, hij wil dade-

¹⁾ Staring, Bodem van Nederland. I, pag. 8.

lijk doordringen tot den ondergrond, daar hij den bodem beschoud in abstracto. De geograaf ziet in den bodem voor alles de woonplaat van plant, dier en mensch, hij beschouwt hem als een factor in de al gemeene wisselwerking, en daarom heeft de dunste humuslaag voor het de grootste waarde, omdat hierdoor de organismen in staat worde gesteld er op te leven.

Deze opmerking laten wij voorafgaan om ons te rechtvaardigen, wan neer onze kaart der bodemgesteldheid wellicht op enkele plaatsen an dere formaties aangeeft, dan die van Staring 1). Wel zijn wij van meening, dat de kaart van Staring niet overal juist meer is, en mis schien nooit juist is geweest, en wij zullen ons oordeel daaromtren niet altijd terughouden, maar het is geenszins ons doel een doorloopend critiek op het werk van den klassieken Nederlandschen geoloog te leveren. Dit zij de taak van meer bevoegde beoordeelaars.

Waar wij een veenlaag van een paar d. M. aantroffen, gaven wij o de kaart veen aan, waar eene andere dunne laag op diluviaal zand, di laag, en in dat geval nooit diluvium. Omtrent de mate van nauwkenne heid zij nog gezegd, dat wij hebben gereisd met de stafkaart en da wij overal de grootste en meest ontwikkelde grondbezitters bij de inteekening hebben geraadpleegd 2). Omdat wij ons voorstellen slechts aan te geven, welk verband er in Westerwolde bestaat tusschen den plantengroei en de bodemgesteldheid, is aan de tweede kaart meer zorg besteed dan aan de eerste. Wij hebben de stafkaart vier maal verkleind, en zoo wij hierbij of bij het inteekenen eenige onnauwkeurigheden mochten begaan hebben, zal het beeld van het geheel daardoor weinig worden geschaad. Als ergens een enkele akker bouwland door ons werd gezien te midden van heide, werd die weggelaten, omdat hij bij inteekening waarschijnlijk eene te groote plaats zou innemen. Wanneer wij vele rijen boomen om bouw- of weiland zagen, teekenden wij die met enkele lijnen om er op te wijzen, dat op die plaats vrij veel hout voorkomt zonder bosschen te vormen.

Bij het werk van H. Dykema, Proeve van eene Geschiedenis der Landhuishouding en Beschaving in de provincie Groningen (Groningen

¹⁾ Blad Westerwolde.

²⁾ Deze wijze van handelen wordt aangeraden door Dr. G. A. Venema in een artikel, Proeve eener Statistiek van den landbouw in de gemeente Winschoten, in den Tegenwoordigen Staat der prov. Groningen II; ook door v. Richthofen, Führer für Forschungsreisende, pag. 32.

1851) werd eene geologische kaart vervaardigd, die langs de Duitsche grens van de zuidpunt der provincie tot Bourtange eene smalle strook moeras aangeeft. West daarvan is diluviaal zand geteekend, dat zich uitstrekt tot eene lijn, die iets ten westen van Onstwedde naar het zuiden gaat en bij dit dorp zich in N. O. richting ombuigt naar Bellingewolde. Hieraan sluit zich dan tot aan Drente hoogveen en toebereide veengrond aan, dat door Dykema op zijne kaart niet wordt onderscheiden.

Ook bestaat er eene geologische kaart der provincie Groningen van Dr. Acker Stratingh, 1837. Deze grondige kenner der provincie geeft langs de Ruiten- en Mussel-Aa zoden- of moeras-ijzersteengrond aan 1), wat Staring niet doet, maar ten onrechte. Deze zodengrond is eene dargmassa, welke hier en daar zooveel ijzeroer bevat, dat op verschillende plaatsen langs de Mussel-Aa oergraverijen 3) bestaan. Langs de stroompjes en riviertjes in de provincie Groningen komen nooit kleiachtige beekbezinkingen of groengronden voor, omdat zij geen kleiachtige bestanddeelen van hunne bronnen kunnen meevoeren 3). De oevers der beekjes bestaan bijna overal uit moerasveen met ijzeroer, dat het meest wordt aangetroffen onmiddellijk aan het stroompje, zoowel in Westerwolde als elders 4). Zoo vindt men b. v. deze zelfde formatie langs de Oude Ae in de Wiede tusschen het Ooster- en Westerdiep in Veendam. Zoowel Dr. G. A. Venema 5) als Acker Stratingh 6) geven hier laagveen aan, terwijl op de kaart van Staring zeeklei voorkomt. Wij hebben ons overtuigd door persoonlijk onderzoek, dat Venema en Stratingh gelijk heb-

¹⁾ Westerhoff en Acker Stratingh, Nat. Hist. der prov. Gron., pag. 14. »Dit oer komt bovendien veel in dezen grond (zand) voor, vormende nu eens lossere, dan weer vastere lagen of brokken, hoedanig men den hiertoe behoorenden moeraserts of zodenijzersteen in Westerwolde langs de Aa aantreft."

²⁾ Vergel. Dr. F. Senft, die Humus-, Marsch-, Torf-, und Limonitbildungen als Erzeugungsmittel neuer Erdrindelagen, pag. 180. Het hoofdstuk over Limonitbildung geeft omtrent ontstaan en voorkomen zeer vele bijzonderheden, die ook voor Nederland van veel waarde zijn.

³⁾ Vergel. Staring, Bodem van Nederland, I, 420.

Dr. G. A. Venema, Proeve eener Statistiek van den landbouw in de gemeente Winschoten. Tegenw. Staat II, 289: »De roodolm-gronden, volgens Staring groen-gronden, in Westerwolde roode darggronden genaamd, zijn hunnen oorsprong verschuldigd aan zoetwater bezinksels... In de roodolm-gronden vindt men in den regel ijzerzodensteen."

⁴⁾ Staring, B. v. N. I, 49.

⁵⁾ Op zijne kaart, die behoort bij het werk "De Dollard", Groningen 1855, door G. A. Stratingh en G. A. Venema.

⁶⁾ Geologische kaart der prov. Groningen.

ben. Maar hoe komt dan Staring tot deze vergissing? Op de kaart van Venema is de kleur, die laagveen aangeeft, moeilijk te onderscheiden van die der zeeklei. Was nu de kaart van Venema vroeger uitgegeven dan de geologische kaart van Nederland, zoo zouden wij aan eene vergissing denken, maar de geologische kaart is een jaar vroeger vervaardigd. Toch is het zeer wel mogelijk, dat Staring de kaart van Venema vóor de uitgave heeft gekend, want ofschoon Dr. Venema geen lid was van de commissie voor de Geologische kaart van Nederland, schijnt hij toch tot haar in betrekking te hebben gestaan 1).

De kaart van Staring is zonder twijfel veel nauwkeuriger, dan die van Stratingh. Laatstgenoemde geleerde toch teekent overal veen op Westerwolde met uitzondering van een strook zand langs de zodengronden en een paar plekken ten Z. W. van Sellinge en Jipsinghuizen, rondom Bourtange en ten noorden van Smeerling, welke zandgrond zich westwaarts tot voorbij Veenhuizen uitstrekt. In noordelijke richting vinden deze diluviale formaties eene voortzetting in de zand- en leemgronden van Oldambt. Het schijnt, dat Dr. Stratingh gemeend heeft, dat heide slechts op hoogveen groeit en daar, waar hij de heideplant zag, veen heeft aangegeven op zijne kaart. Hierin echter vergist hij zich; want wij zagen op vele plaatsen, waar de zode van de heideplant was weggestoken, de bovenste grijze laag van het zanddiluvium. Wel zal de teelaarde door de heide gevormd voor een deel bestaan uit veenstot?), maar dit is zoo weinig en die laag is zoo dun, dat volgens onze meening hier geen hoogveen mag worden aangegeven.

Hoe voortreffelijk het werk van Staring moge zijn, ook hierin kunnen fouten zijn gemaakt of zijn ontstaan door veranderingen door den tijd aangebracht. Onze hoofdbezwaren tegen zijne kaart zijn, dat hij geen onderscheid maakt tusschen afgegraven hoogveen en in cultuur gebracht hoogveen, waar nooit turf is gegraven. Ook Venema schijnt te meenen, dat voor het geval op hoogveen gebouwd wordt, daar eerst een laag turf is weggegraven 3). Een ander bezwaar is, dat Staring over groot

¹⁾ In deel II van de Verhandelingen komt voor een Verhandeling over barnstes in de prov. Groningen van Dr. Venema. Op pag. 5 aldaar spreekt de commissie ook van eene verzameling steenen van Winschoten afkomstig. Deze zijn waarschijnlijk ook door Dr. Venema gezonden, daar hij burgemeester dier plaats was.

²⁾ Deze massa wordt onder den naam van plaggen gebruikt als brandstof.

³⁾ Dr. G. A. Venema, De Veenen en de Veenkolonien, II, Tegenwoordige Sudder Prov. Groningen. Bijdragen III, pag. 372. In Zuidbroek, Muntendam, de Met den enz. heeft daardoor de bouwakker (door het gedeeltelijk weggraven van het vee)

uitgestrektheden afgegraven hoogveen aangeeft, waar volgens onze meening nooit veen heeft gelegen. Wij hebben tijdens ons verblijf in Westerwolde vele personen van verschillenden leeftijd, van verschillende positie en stand gevraagd, of hun bekend was, dat in vroegere jaren langs de Duitsche grens en in het midden tusschen de Ruiten- en Mussel-Aa veen was weggegraven, maar zij wisten niets anders, dan dat de gewoonte van het plaggen steken misschien reeds vele eeuwen oud was. En door het plaggen steken wordt het veen niet afgegraven.

Venema 1) deelt mee, dat hooge venen op tweeerlei wijze kunnen worden afgegraven nl. ôf door ze alleen op hoofdgoten te leggen, ôf door er een of meer hoofdkanalen aan te geven. In de zoogenaamde afgegraven venen van Westerwolde vindt men nu geen kanalen, dus de laatste wijze van handelen vervalt. Hij zegt ook, dat in het eerste geval alleen turf wordt gegraven voor eigen gebruik of voor verkoop in den omtrek, wat dan per as wordt vervoerd. Wanneer men in aanmerking neemt, dat Westerwolde steeds schaars bevolkt was, zoodat weinig turf werd verbrand, dat bijna overal plaggen kunnen worden gestoken, dat de bevolking geen geld heeft om turf te koopen, dat Westerwolde altijd veel hout heeft opgeleverd 2), dat de streek langs de Duitsche grens, die als

soms een wonderlijk voorkomen. Terwijl de rogge op de veenbouten golft, stuit het oog op een steil afgestoken kant, waar eene breede strook turf de heerd of plaats dwars doordeelt." Hieruit blijkt duidelijk, dat Venema onder bouten gronden verstaat, waar in elk geval eenig veen is afgegraven. Wij weten echter zeker, dat van de bouten in Meeden nooit turf is gegraven, dan een weinig in den laatsten tijd, en wij meenen daarom, dat Staring ze te onrecht als afgegraven veen aangeeft. Bouten zijn bouwlanden (rogge- en aardappelvelden), waarop het hooge veen onmiddellijk in cultuur is gebracht. Is het veen eerst weggegraven, zoo spreekt men van dalgronden.

Ook kunnen wij bewijzen, dat in Meeden de bouten niet zijn afgegraven. Aan hunne noordzijde, waar het veen door zand of klei wordt begrensd, vindt men één klem (dikte van een turf) veen, en de veenlaag wordt naar het zuiden steeds dikker, zoodat men aan het zuid-einde van de bouten, bij den Veensloot 7, 8 of 9 aantreft. De veenlaag kijlt dus naar het noorden uit, en dit kan alleen zoo regelmatig zijn, wanneer men met e'n vorming langs natuurlijken weg te doen heeft en niet met eene vervorming door menschen. Elders echter zegt Venema, Teg. Staat II, pag. 239, Proeve eener Statistiek van den landbouw in de gemeente Winschoten: »Door veenbouten hebben wij willen aanwijzen die bouwgronden, die op onafgegraven hooge veenen zijn aangelegd, of die na vervening nog een zoo dikke laag veen hebben behouden, dat het graven van turf onder den bouwgrond mogelijk wordt gemaakt."

¹⁾ Tegenw. Staat III, pag. 369 volg.

²⁾ Westerhoff en Acker Stratingh, Nat. Hist. der prov. Gron., pag. 315. "Over het algemeen is de naam Wold eigen aan veenplaatsen, en komt alzoo overeen met de

afgegraven hoogveen wordt aangegeven, zeer moerassig is, en dat nog veel meer zal geweest zijn, toen de afvoer van water nog slechter was, dan tegenwoordig ¹), dat niemand in Westerwolde aan het bestaan hebben van hooge venen aldaar gelooft, zoo is het zeer bedenkelijk of die er ooit geweest zijn ²).

Eene eigenaardigheid der Westerwoldsche venen is, dat ze grootendeels als moerasveen zijn ontstaan. Langs de Duitsche grens vindt men zoo goed als niets anders, dan moerasveen; in het westen is daarover meestal een laag hoogveen gegroeid. Dit komt o. a. voor bij ter Maarsch, waar in kuilen tusschen de zandheuvels kleine plassen hebben gestaan, die volgegroeid zijn met laagveen, welke op haar beurt weer overdekt

voormalige boschrijkheid der veengronden, waarvan deze nog de ontwijfelbare bewijzen in hunnen schoot dragen; geene gronden ook leveren alsnog meer bosch op, of zija daarvoor geschikter, dan de veenachtige zandgronden. Westerwolde vooral was vroegez zeer boschrijk, gelijk het nog het boschrijkst gedeelte van ons gewest uitmaakt. Uit eene deductie van zekeren advocaat Johannes Verting, in het jaar 1642 geschreves, blijkt, dat de stad Groningen o. a. beschuldigd werd van in het jaar 1637 uit de Kloosterwouden gehouwen en naar Groningen vervoerd te hebben 3000 oude, groots eikenboomen van 20, 16, 12, 10, 6, 5, 4 enz. rijksdaalders waarde. Men verhaakt, dat de bosschen tusschen Onstwedde en ter Apel door en bij langs de Mussel-Aa zeo dicht en aaneengeschakeld hebben gestaan, dat de eekhorentjes, die er voor ongeveer 80 jaar nog aanwezig waren, van de eene plaats tot de andere van boom tot boom konden springen, zonder den grond te raken. H. A. Spandaw, Verh. over de herkomst der houten brug in de Verh. der 2de klasse van het Kon. Ned. Instit. II, 1821, pag. 45.

R. Fruin, Geschiedenis van Westerwolde. Leiden 1886, pag. 15. "Het land was varmoedelijk in die oude tijden (Frankische) grootendeels bosch. Opmerkelijk is, dat is den naam van het gewest zelf en in de daarin gelegen dorpen het begrip »bosch" steeds wordt aangetroffen; want zoowel "wold" en "lo" als "Wedde" en »Wede" hebben die beteekenis (Nomina Geographica Neerlandica I, 73)." Ons werd de volgende sage medegedeeld. De toren van Onstwedde, die geheel van steen is opgetrokken, bestaat uit steenen, die door het klooster te ter Apel zijn gebakken. Zij werden op de volgende wijze vervoerd. In het bosch, dat zich van ter Apel tot Onstwedde uitstrekte, stond een rij mannen en de een overhandigde den ander de steenen.

Iemand, die in het begin van deze eeuw in Wedde notaris was, verkocht voor meer dan 100,000 Gld. boomen. Had men in dien tijd hout noodig in Oldambt, zoo zoad men op goed geluk een wagen naar Westerwolde, en die kwam nooit leeg terug.

¹⁾ Op het archief te Groningen ligt een stuk uit het begin der i 7de eeuw, waarin de bewoners van Bunde enz. klagen bij de Staten van Groningen over het water. dat hen van Westerwolde toestroomt.

Ook in de Verhandelingen der Geologische commissie vonden wij hiervan gees verklaring.

is met hoogveen ter dikte van ongeveer één meter 1). De oorzaak zoowel van de vorming van dit veen, als van zijn voorkomen in kuilen moet gezocht worden in de golvende bodemgesteldheid, waardoor het water gedwongen wordt daar plassen te vormen 2). Dit voorkomen van veen in kuilen 3) is iets typisch voor Westerwolde; van eene regelmatige veenbedekking kan geen sprake zijn 4). Venema bedoelt ditzelfde verschijnsel, wanneer hij zegt 5): "Een zwak golvende bodem, veelal van zand, enkel van leem, waaronder soms potklei rust, die bekkens en langwerpige heuvels vormt, strekt zich van het zuiden naar het noorden langzaam afdalende uit. Daarop rust een laag veen van meerdere of mindere dikte, dat zich zelfs nog buiten de dijken uitstrekt. Alleen de smalle soms zeer uitgestrekte, zacht glooiende ruggen der heuvels zijn van die veenbedekking verschoond gebleven." Dit voorkomen van veen in kuilen, vindt men vooral aan de randen der hooge venen, waar de veenlaag dun is en de geringste verheffing van den ondergrond ze doet verdwijnen. Dit is het geval bij ter Maarsch 6), waar de venen van Stadskanaal grenzen

¹⁾ Hiervan spreken ook Westerhoff en Stratingh, Nat. Hist. der prov. Gron., pag. 63. Dit verschil (tusschen hooge en lage venen) doet zich dan ook voornamelijk in de bovenste lagen der hooge venen voor, in de onderste lagen, waar de omstandigheden eenmaal gelijk waren met die in de lage venen in het algemeen, vindt men zelfs de veenstof of den turf veelal van gelijken aard, als die in de baggervenen, zoodat hooge venen veelal eerst lage venen schijnen geweest, of lage in hooge venen schijnen veranderd te zijn."

²⁾ Westerhoff, pag. 22. "De gaasten zijn dus als verheffingen van den algemeenen zandgrond te beschouwen, welke op eene meerdore of mindere diepte onder de kleien veengronden voortloopt; waar de zandgrond zich zoo aanmerkelijk verhief, hebben deze niet kunnen ontstaan, daar de bodem van de aanslijking en veenvorming vrij bleef."

Pag. 72. •De hooge venen bevinden zich wel hooger dan de lage, maar altijd min of meer lager, dan de omringende landen, zoodat het water zich in die laagten, als in een kom, moest verzamelen."

Pag. 101. »Het veen voorts altijd in een kom of tusschen gaastruggen gelegen zijnde, heeft meerendeels eene gelijke oppervlakte, daar de diepte verschilt."

³⁾ Dr. J. M. van Bemmelen, Tegenw. Staat III, 224 te vergelijken; Prof. H. C. van Hall, Tegenw. Staat I, 365.

⁴⁾ Vergel. Dr. G. A. Venema, Tegenw. Staat III, 369. De venen en veenkoloniën der prov. Groningen, en Tegenw. Staat IV, pag. 43, Over den bodem van het Oldambt en Westerwelde.

⁵⁾ Dr. G. A. Venema, De bodem van Oldambt en Westerwolde, Tegenw. Staat III, 6.

⁶⁾ Dit zelfde vindt men in de kom der gemeente Meeden, waar Staring en Venema beiden slechts diluviaal zand op hunne kaarten aangeven, maar waar veen ter dikte

aan de hooge diluviale gronden van Onstwedde. Eigenlijk is geheel Westerwolde niets anders, dan een diluviale grensscheiding tusschen de Drentsche en Duitsche venen 1) en daarom ook ligt er weinig veen en komt het voor in grootere en kleinere kommen 2), zooals later nog nader zal worden aangetoond.

Over het voorkomen van het laagveen behoeft, nadat boven de ligging van het hoogveen in kommen besproken is, die zich eerst met water vulden, waarin dan waterplanten groeiden, niet veel gezegd te worden. In deze kommen toch ontstond op die wijze eerst laagveen 3), daarna moerasveen en het geheel werd overdekt met een laag fabrieks-4) en grauw veen 5). De onderste lagen van bijna alle venen dienen dan ook, waar zij zijn aangesneden, tot het maken van baggerturf. Meestal zijn het slechts kleine uitgestrektheden, waar het laagveen op die wijze voorkom, daar de dalen tusschen de lage zandheuvels eene geringe oppervlakte hebben en alleen een gedeelte van het jaar met water zijn gevuld. In

van één en twee meter in kuilen voorkomt. Dus ook hier op de grens van veen met eene andere formatie, n. l. roodoorn.

¹⁾ H. Dykema, Proeve van eene Gesch. der Landhuish. en Beschav. in de prov. Gron., II, pag. 572. "Eene hooge zandrug, gemiddeld ruim $\frac{1}{1}$ uur breed, loopt van Wedde in de lengte door Westerwolde tot het Klooster ter Apel, in de richting ozveer van het N. W. naar het Z. O. Verder Z. W. gaat de grond in hoogveen over, dat zich over het Stads-Kanaal uitstrekt en met de vonen van Drente samenhangt."

²⁾ Vergel. ook Senft, die Humus-, Marsch- und Limonitbildungen etc., pag. 99.

³⁾ Vergel. Staring B. v. N. I, pag. 39, 45 en 49.

⁴⁾ Onder fabrieksturf verstaat men eene soort, die bruin van kleur is en vooral verl vlok bevat, welke gevormd is door wollegras (Eriophoron vaginatum en angastifolium) Landhuishoudkundige flora door H. C. van Hall, pag. 235.

De grauwe turf is geel bruin van kleur, ligt meestal onmiddellijk op den fabrieksturf en vormt de bovenste laag. Hij bestaat, behalve uit de overblijfselen van heide, vooral uit mossen, waaronder het gewone veenmos (sphagnum acutifolium) v. Hall, 278.

⁵⁾ Ons zijn ook gevallen bekend, dat het laagveen in kommen voorkomt onder eens regelmatige bedekking van hoogveen over groote uitgestrektheid. In dat geval wordt de ondergrond gevormd door een diluviale zandbodem, waarin kuilen of kleine daks zijn gelegen. Deze laatste werden met water gevuld, daarin ontstond laagveen en over het geheele terrein groeide hoogveen, of het hoogveen, dat reeds de hoogere strekss bedekte, groeide ook hier over. Dit komt o. a. voor in het oostelijk deel der gemeeste Meeden en in de Vetstukken ten westen van ter Apel.

Vergel. ook Staring B. v. N. I, 79. Hier wordt ook gezegd, dat het Meerland vrosger met hoogveen zou overdekt zijn geweest, wat ons onwaarschijnlijk voorkomt, omdat de bagger, daar gegraven, onaangenaam riekt, omdat er klei in voorkomt, omdst er op onde kaarten een meer is geteekend, dat in deze eeuw nog niet was verdwenen.

de Fleddervenen Z. W. van Onstwedde en ook nog W. daarvan ziet men groote velden, waar een dunne laag hoogveen het laagveen bedekt.

Toch zijn er ook streken in Westerwolde, waar het laagveen onmiddellijk aan de oppervlakte treedt nl. daar, waar het land het geheele jaar door een moeras is, of ten minste in den winter onder water staat. Dit is het geval langs den Leidijk 1) ten N.O. van ter Apel, waar ook Kuyper 2) een moeras aangeest; verder in de Boven-Mussel 3) en in de streek tusschen ter Wisch en ter Haar tot Musselhuizen, welk land in den winter onder water wordt gezet, doordat dan de Ruiten-Aa een gedeelte van haar water door deze laagte naar de Mussel-Aa doet stroomen 4).

Osschoon de uitgestrektheid land, waarop in Westerwolde veen voorkomt, vrij groot is, en zels grooter dan zij op de kaart hierbij is geteekend, omdat wij niet in staat waren alle kleine kommen met veen aan te geven, mag men toch niet zeggen, dat er veel turs kan worden gegraven. Alleen ten oosten van den Leidijk, O. van Sellingen, in het Weender Veld, Sellinger Veld en Sellinger Beetse, in de Fledder en W. daarvan trest men venen aan, die veel turs kunnen opleveren. Wanneer men alles vergraast, zal men op enkele plaatsen ten oosten van Sellingen 12 klem veen hebben, zoo ook in de Sellinger Beetse en het Alteveer, terwijl in de Fledder-venen de turs maar één meter dik zit en zels hier en daar de naakte zandgrond aan de oppervlakte komt 5). Over het algemeen is de turs van Westerwolde echter van uitstekende kwaliteit, hij is met uitzondering van de bovenste lagen zwart van kleur en meestal gevormd als moerasveen.

Van de ijzeroergronden kunnen wij niets meer mededeelen, dan boven reeds is gedaan, waar ook tevens in eene aanhaling van Venema is gezegd, dat zij in Westerwolde roode darggronden heeten, waarom zij dan

¹⁾ Vergel. H. Dykema, Proeve van eene Gesch. der Landhuishoudk. en Beschav. in de prov. Gron., II, pag. 572: En voorts (wordt deze zandrug afgebroken) door derrygrond tusschen ter Wisch en ter Haar. Z. W. van deze strook veen zijn de lage derrylanden van de Mussel gelegen, door welke de Mussel-Aa stroomt.... Ten N.O. zijn uitgestrekte lage wei- en hooilanden gelegen, welke meerendeels uit derry- en licht bruine veengrond bestaan, zooals ook de zoogenaamde Eems- en Bourtangerveenen".

²⁾ Kaart der prov. Groningen, schaal 1: 178,500.

³⁾ Vergel, over het voorkomen van laagveen langs stroompjes ook Senft 98.

⁴⁾ Tusschen ter Wisch en ter Haar ligt in de Ruiten-Aa een grondpomp, die het water onder den zandweg door voert. Door sloten en een molen wordt gezorgd, dat men het water zoo spoedig mogelijk weer kwijt is, maar dit neemt niet weg, dat het land hier elken winter nog onder water komt.

⁵⁾ In Drente nabij Nieuw-Dordrecht zagen wij putten met 32 klem.

op de kaart ook niet afzonderlijk zijn aangegeven. Zij komen het meest voor langs de Mussel-Aa, maar ook ontbreken zij niet langs de Ruiten-Aa, en ook de beekjes, die daarin uitwateren, toonen door hun bruin water met roode vlokken, dat langs hunne oevers oer voorkomt.

Van oudere formaties komen op Westerwolde slechts voor het zanden scandinavisch diluvium. Het zanddiluvium beslaat op onze kaart eene veel grootere ruimte, dan op die van Staring; omdat wij meenden, zooals boven is medegedeeld, dat de geologische kaart te onrecht vele streken met afgegraven hoogveen aangeeft, waar volgens onze meening nooit veen heeft gezeten. Het zanddiluvium vormt over het algemeen een samenhangend geheel, dat ten oosten, zuiden en westen wordt begrensd door hoogveen, ten noorden aansluit aan de kleilanden van Oldambt Het doet zich voor als een zacht golvend terrein met hoogteverschillen van slechts een paar meter, die door het groeien van kleine plekjes veen 1) en door menschelijken arbeid op den roggeakker nog geringer gemaakt zijn. Op enkele plaatsen verheffen deze heuvels zich uit het omliggende terrein en zij dragen dan den naam van bergen, zooals de Braamsberg, een langgerekte heuvelrug van geringe hoogte, de Ommersberg, de Doeseberg en Vosseberg. Dan weer zien wij hoogten, die geen bepaalde strekking vertoonen, een weinig zich verheffen boven het omliggende land en dienen tot menschelijke woonplaatsen. Westerhoff en Stratingh vergelijken deze hoogten (esschen) met de garsten 2), die 200 talrijk zijn in andere deelen van Groningen. Het is bekend, dat de mensch tot het ontstaan van deze hoogten ook heeft bijgedragen door de eeuwenlange bemesting met plaggen 3). Nu eens zijn deze esschen meer lang,

¹⁾ Dr. G. A. Venema, Over den bodem van het Oldambt en Westerwolde, Tegenv. Staat, pag. 2. Deze alluvien hebben de dalen tusschen de zand-, leemig zand- es leemhoogten trachten te vullen, soms de ruggen der hoogten bedekt en op verschillende wijze den grond geöffend".

²⁾ Nat. Hist. der prov. Gron. "Westerwolde..... vertoont ook menige hooge zankstreek of Gast, op of bij welke meestal de plaatsen gelegen zijn, wordende hier, evesals in Drente, vooral tot bouwlanden gebruikt en evenals daar wel Essen genoemd.... Deze ligging van de dorpen en gehuchten op of aan de Gasten of Essen, welke mee zoo algemeen waarneemt, verdient onze aandacht, daar zij eene oude wijze van bewnning vaststelt. Het waren toch deze hoogten, die het eerst zullen bewoond zijn geworden als leverende den noodigen grond op geschikt ter bebouwing eu waarop men soewel 's winters als 's zomers voor alle water beveiligd is."

³⁾ Staring, B. v. N. I, pag. 12.

dan breed, dan weer zijn beide afmetingen ongeveer even groot, of de breedte overtreft de lengte. Moesten wij ze met een bergvorm vergelijken, wij zouden het doen met Tafels!), Schollengebergten²) en Rompgebergten³), hoezeer zij in innerlijke structuur daarmee verschillen; met de eerste zullen zij nog de meeste overeenkomst hebben.

Een geheel ander beeld geeft het zanddiluvium weer op andere plaatsen te aanschouwen. Wanneer men langs den zandweg van ter Borg naar den Braamsberg wandelt, ziet men, dat overal, waar de voet van mensch of paard of het wiel van den wagen het plantenkleed heeft losgemaakt, de wind tot een geologische factor 4) is geworden. Wij dachten hier werkelijk aan een lösslandschap, zooals wij dat hadden gezien in enkele rivierdalen van de provincie Saksen in Pruisen. Op sommige plaatsen is het zand ter diepte van 1/2 à 3/4 M. weggestoven, terwijl in dien hollen weg op de plaatsen, waar de vegetatie ongedeerd was gebleven en zoodoende den zich daaronder bevindenden bodem tegen verstuiving beschutte, zuilen van zand waren blijven staan. Waar een druk verkeer is, of waar om andere reden de weg verbreed werd, vindt men dit eigenaardig verschijnsel over groote uitgestrektheid, maar dan ook weer is de plaats, waar de verstuiving plaats heeft, slechts eenige meter breed. Staring geeft hier zandstuivingen aan; wij hebben het echter niet gedaan, omdat ze slechts eene kleine ruimte beslaan en op meer plaatsen van Westerwolde voorkomen, waar de omstandigheden gunstig zijn.

Tengevolge van deze zandstuivingen kunnen ook heuvels ontstaan. Venema ⁵) verklaart dit verschijnsel uitvoerig, hij bespreekt de richting loodrecht op den voorheerschenden wind en hij zet uiteen, waarom de westelijke helling der heuvels steiler is dan de oostelijke ⁶). Wij meenen

¹⁾ Vergelijk von Richthofen F. f. F. pag. 680.

^{2) &}quot; dezelfde " " 655.

³) • , , 669.

⁴⁾ Vergel. Dr. Hermann Credner, Elemente der Geologie, pag. 272, waar o. a. het standaardwerk hierover is geciteerd. v. Richthofen, China. Bd. 1, 56—125.

⁵⁾ Dr. G. A. Venema, Over den bodem van het Oldambt en Westerwolde. Tegenw. Staat IV, pag. 40 waar hij o.a. zegt: "Aan de oostzijde loopen de dalen tusschen de heuvels steiler op dan aan den westkant. Dit komt door den voorheerschenden W. wind."

De duinenvorming is hetzelfde verschijnsel. Vergel. o. s. Hann, von Hochstetter und Pokorny, Allgemeine Erdkunde, pag. 360.

De zandstuivingen, die heuvels vormen, kan men in korten tijd bestudeeren bij een sneeuwjacht, wanneer de sneeuw door het een of ander voorwerp wordt tegengehouden.

⁶⁾ Supan, Physische Erdkunde pag. 204 is een ander gevoelen toegedaan "Stets ist

dit verschijnsel te hebben opgemerkt bij den Kieberg ten N.O. van Onstwedde, die eene strekking heest van Z.W. N.O. en aan de oostzijde eene veel zachtere helling, dan aan den westkant, maar hier was hij reeds gedeeltelijk vergraven, zoodat wij alles niet nauwkeurig konden nagaan. De heuvel bestaat uit zacht, fijn, wit zand. Aan de westzijde is een kom 1), waarin veen is gegroeid zoodanig, dat de laagjes moerasveen tweemaal door een laagje grijs zand, dat er over gestoven is 2), worden afgewisseld. Het meest waarschijnlijk is, dat deze kom door den wind is uitgehold en dat de heuvel daardoor is opgeworpen. Toch bestaat ook de mogelijkheid, dat het eene oude grasheuvel is 3). Osschoon groote grasheuvels op Westerwolde voorkomen, zijn wij echter meer geneigd de eerste veronderstelling als de ware aan te nemen, omdat de geheele gedaante (sikkelvormig) weinig op een grasheuvel gelijkt en daartoe ook te uitgestrekt is.

Dr. G. A. Venema, die het diluvium in vijf onderdeelen verdeelt, rekent dit zand tot de jongste formatie en omschrijft ⁴) het als "zand, waarin zeer enkel een kei voorkomt en dat in horizontale laagjes ligt; Staring doet hetzelfde ⁵). Beide geleerden zijn geneigd ook onder het zanddiluvium op te nemen de leemlagen van Wedderveer, bij Veele, bij de Oosterbrug en langs de Vledderkampen te Vlachtwedde, bij den Ren-

die Böschung auf der Windseite sanfter als auf der Leeseite, wo der Sand nur der Schwerkraft folgt."

¹⁾ Vergel. ook C. J. Geertsema, Beschrijving van den landbouw in de districter. Oldambt, Westerwolde en Fivelgo, pag. 95: "Op de zandgronden ziet men hier en daar, door den wind opgeworpen woeste zandheuvels en daarnaast uitgewaaide lasgten, die aan zandverstuivingen blootstaan."

²⁾ Dr. G. A. Venema, Tegenw. St. IV, pag. 43 spreekt hierover: "Tusschen het sand treft men hier en daar veenlaagjes aan; o. a. komt veen voor tusschen de Holte Esch en Onstwedde, W. van en aan den weg van Wedde naar even genoemd dorp, bij het dennebosch van Onstwedde naar N. Pekela, W. van en aan de Ruiten-As bij ter Borg en bij den Rijzendam tusschen Jipsingehuizen en Sellingen. Dit zand is stuifsand."

Hetzelfde zagen wij aan de Zuidwoldsche vaart, waar $1\frac{1}{2}$ voet zand het veen bedekte en waarover nog eens veen was gegroeid.

Vergel. ook Staring, B. v. N. I, 207.

³⁾ Westerhoff en Stratingh, Nat. Hist. der prov. Gron., pag. 289. •Op een half un ten zuiden van Vlachtwedde nabij het zoogenaamde Veldhuis aan de linkerzijde van den rijweg naar ter Apel treft men een heuvel aan, dat een grafheuvel is."

Verg. ook H. Dykema, Gesch. der Landhuish. en Beschaving in de prov. Gros. II., 557.

⁴⁾ Tegenw. Staat, IV, pag. 7. Over den Bodem van het Oldambt en Westerwolds

⁵⁾ B. v. N. II, 114.

nenberg onder Wollinghuizen, in de leemdobben bij Sellingen en in de noordelijk daarvan gelegen gronden onder Jipsingehuizen, in het Sie, in de Roullage langs de Olden, onder Loude en op meer plaatsen in de Louder Marke; maar Staring 1) spreekt de mogelijkheid uit, "dat nadere waarnemingen zullen aantoonen, dat hij één geheel vormt met het grintdiluvium", en Venema merkt hierbij op, dat omgekeerd hij "ook in het scandinavisch diluvium schichten van het zanddiluvium kan aanwijzen 2)". Waar dus niet bepaald is uitgesproken, dat deze formatie tot het zanddiluvium behoort, hebben wij haar gerekend tot het scandinavisch diluvium, omdat wij ons meer ten doel stelden eene kaart van de bodemgesteldheid, dan van de geologische formaties te geven. In het scandinavisch diluvium komt juist veel leem voor, en daarom hebben wij de leemlagen, die een anderen ouderdom kunnen hebben, evenzoo gekleurd. Bij Wedderveer zat onder een meter zand één tot twee voet leem, dat grootendeels is vergraven, de leemdobben bij Sellingen leveren ook weinig meer op, terwijl de uitgestrektheid land bij Vlachtwedde, waar leem wordt gevonden, 25 bunder 3) beslaat.

Het is eene bekende zaak, dat het zanddiluvium in Groningen niet dik is 4), wij vinden dus juist die laag, die met het grintdiluvium in aanraking komt en daarmee eenigszins zal vermengd zijn. Kan hierin ook eene verklaring van het voorgaande liggen?

Wat de strekking van deze diluviale zandheuvels aangaat, kunnen wij slechts na herhaaldelijke onderzoekingen beamen, wat Venema heeft gezegd ⁵). Zoowel de meer alleen staande heuvels als de samenhangende zwakke golvingen van den bodem hebben eene noordelijke strekking. De verklaring aldaar, als zou de wind hierin een belangrijke rol spelen, maken wij ook gaarne tot de onze.

Het Scandinavisch diluvium komt op de kaart van Staring alleen voor ten W. en N. van Onstwedde, in den Hasseberg, O. van Sellingen en op eene plaats N.W. ervan aan den Leidijk; wij hebben daaraan toegevoegd de plaatsen, die boven vermeld zijn om redenen aldaar opgegeven. Deze laatste leemmassa's zijn meestal overdekt met zanddiluvium of darg, ontstaan, doordat het leem het water niet doorliet en op die

¹⁾ B. v. N. II, 118.

²⁾ Tegenw. Staat IV, 43.

³⁾ Volgens den heer Tammes te Vlachtwedde.

⁴⁾ Staring, B. v. Ned. II, 119.

⁵⁾ Tegenw. Staat IV, 40.

wijze den groei van waterplanten bevorderde. Wij hadden dus in de meeste gevallen laagveen kunnen aangeven, zooals Staring bij Veele; maar omdat de darg hier bij kommen zit, kwam het ons beter voor den ondergrond op de kaart te teekenen.

Wanneer men langs den weg van Veenhuizen naar Onstwedde gaat, heeft men aan zijne linkerhand leem, dat geel-wit van kleur is, enkele gerolde granietblokken bevat en vele kwartsieten. Hier begint het scandinavisch diluvium, dat zich aan de eene zijde onder de dargachtige weilanden 1) van de Aa uitstrekt, aan de andere tot aan Onstwedde en Tange. Het land is, voor zoover het niet wordt bebouwd, zeer oneffen. De Onstwedder esch is hooger dan het omliggend terrein, zwak gewelfd en voor meer dan de helft bedekt, behalve door teelaarde, door een laag diluviaal zand 2), die naar Onstwedde toe dikker wordt. Op den Esch vonden wij weinig steenen; maar dat mag daaraan worden toegeschreven, dat sedert vele jaren zij vandaar zijn weggevoerd 3).

De Hasseberg ten oosten van Sellingen is eene ovale en niet ronde hoogte, zooals Staring zegt ⁴), ongeveer 3 M. hoog, met vrij groote helingen en vlak gewelfden top, die in bouwland is veranderd. Hij ligt geheel in het veen. Op eene plaats, waar de heuvel was aangesneden, zagen wij onder de 1½ voet dikke laag teelaarde, een laag zand van één meter met vuursteen, kwartsieten en gerolde granieten, waaronder bij afwisseling laagjes wit-geel leem, die slechts weinig golvend waren, en daartusschen laagjes zand van verschillende kleur.

De kleine leemlagen, waarvan boven sprake was, bevatten slechts bij uitzondering steenen ⁵).

¹⁾ Vergel. Venema, Tegenw. Staat IV, 12.

^{· 2)} Dr. G. A. Venema, Tegenw. Staat IV, p. 22. "De Onstwedder Holte-Esch, die vermoedelijk wel voor een deel een luchtig, voor een ander deel een dik kleed van zanddiluvium heeft ontvangen...."

³⁾ Dr. G. A. Venema, Tegenw. St. IV, 30. "Zware keien komen insgelijks voor langs de N. grens van de rogge-esch van Onstwedde en wel langs den zoom van het veen en in de noordelijke afhelling van de Onstwedder Tange, waaruit ze echter reeds zijn weggenomen." Pag. 31 aldaar. "Op ongeveer 1,5 el diepte onder den bodem, N. van den Holte-Esch liggen min dikke keienlagen."

⁴⁾ B. v. N. II, 26.

⁵⁾ Dr. G. A. Venema, Tegenw. St. IV, p. 27. "In het scandinavisch diluvium worden meestal overal vuursteen en keien gevonden; alleen in Westerwolde, waar de leemlagen zich tot kleine uitgestrektheden en tot weinig diepte beperken, zal men hier en daar tevergeefs naar vuursteenen en keien zoeken, alhoewel zij ook daar niet geheel worden gemist."

Volledigheidshalve geven wij nog even de strekking van den Onstwedder-Esch en den Hasseberg aan. Die van den eersten is N. O. Z. W., die van den tweeden ongeveer N. Z. Zoowel Staring 1), die zoowel de strekking der afzonderlijke heuvels, als die der verschillende bergketens, waarin hij de verschillende toppen groepeert, tracht duidelijk te maken, als Venema²), die zich alleen met de strekking der afzonderlijke heuvels bezig houdt, hebben getracht hiervan eene verklaring te geven. Wij wagen het niet hieraan iets toe te voegen, maar alleen merken wij op, dat de drifttheorie van hunne dagen later heeft moeten plaats maken voor de glaciaaltheorie van onzen tijd 3). Met uitzondering van den Hasseberg, die eenzaam midden in het veen ligt, vormen al deze zanden grintformaties eene enkele samenhangende heuvelenrij 4), die dezelfde strekking heeft als de bergreeksen van Staring (N.W. Z.O.) en slechts op een paar plaatsen in kommen grootere hooge venen insluit. Evenals de Hondsrug, waarmee zij ongeveer evenwijdig loopt, daalt zij van het zuiden naar het noorden; terwijl zij bij het Schot ruim 12 M. hoog is, ligt Wedde nog slechts 1,50 M. boven A. P.

De teekens, die Staring gebruikt om de verschillende grondsoorten aan te duiden, zijn ook hier aangewend, alleen er aan toegevoegd de letters ch (cultuur op hoogveen ⁵), daar bij Staring deze eigenaardige wijze van bebouwing is veronachtzaamd.

II. PLANTBEKLEEDING.

"Wel is waar heest men streken, waar de weilanden en hooilanden bepaalde gronden innemen, waar het bouwland nimmer groen wordt gehouden; maar, waar de landbouw zich het meest heest ontwikkeld, heest zich het stelsel van wisselbouw gevestigd. De verdeeling van bouw-

t) B. v. N. 11, p. 81, 157, 160.

²⁾ Tegenw. St. IV, 23.

³⁾ Dr. H. Credner, Elemente der Geologie, pag. 716.

⁴⁾ Vergel. H. Dykema, Proeve van eene Gesch. der Landh, en Besch. in de prov. Gron., p. 572.

⁵⁾ Dit is de cultuur op bouten. Wel komt het voor, dat het veen op de bouten later is afgegraven, en zij daardoor in dallen zijn veranderd, waarbij echter de naam bouten bleef bestaan, maar dit neemt niet weg, dat die cultuur elders nog op den ouden voet wordt gedreven. De bouten, die ook als kleigronden in Oldambt voorkomen, vorderen eene afzonderlijke studie bij een anthropo-geographische beschouwing omtrent den aanleg der dorpen in Oldambt en Westerwolde.

en weilanden op eene agronomische kaart is derhalve alleen op streken, waar de landbouw zich nog niet aan de voorvaderlijke gewoonten heeft onttrokken, of waar de waterontlasting onvoldoende is, toepasselijk: zoodra zij voorwaarts treedt, werpt de grond die onderscheiding af, en bij afwisseling ziet men nu eens de ploeg den grond doorsnijden, en de goudgele aren in den wind wiegelen, of paardeboonen hunne stengels verheffen, of de roode bloemen van klaver prijken, of het veld met lichtgele koolzaadbloemen versierd, waar vroeger of later de koeien grazen of paarden weiden 1)."

Osschoon wij het niet eens zijn met deze aanhaling en meenen, dat een dergelijk landschap, als boven wordt geschilderd, eenvoudig kon worden aangegeven met wisselbouw, blijkt daaruit toch, dat Venema met zijne denkbeelden van eene agronomische kaart, van oordeel zou zijn, dat Westerwolde wegens de oudvaderlijke toestanden 2), die daar nog heerschen, zeer geschikt zou zijn tot eene dergelijke karteering. Wij hadden gehoopt in Dr. C. A. J. A. Oudemans "de Flora van Nederland" een even trouwen gids voor dit gedeelte onzer studie te vinden, als in Staring voor het eerste deel; de geleerde schrijver toch stelt zich ten doel om, evenals Staring eene beschrijving van den bodem vervaardigde, een denkbeeld van de plantenwereld te geven 3). Maar voor een geoloog is de plaats, waar eene bepaalde formatie voorkomt, van meer belang, dan voor een plantkundige, wanneer hij zich niet bepaald met de aardrijkskundige verspreiding der planten bezig houdt. Prof. H. C. van Hall 4) geeft hier en daar bijzonderheden, die Westerwolde in het bijzonder betreffen; maar overigens is hij in dit opzicht niet uitvoeriger. Omtrent de heideplant (Calluna vulgaris en Erica tetralix) is eene studie geschreven door Dr. G. A. Venema⁵), die voor ons doel daarom te meer waarde heeft, omdat hij zijn onderzoek in Westerwolde heeft ingesteld. Een werk, dat de plantenwereld der provincie Groningen alleen behandelt, zooals dat van eenige andere provincien bestaat, schijnt niet voorhanden te zijn, althans is het ons niet bekend. Voor de cultuurgewassen is veel samengebracht door G. Reinders 6).

¹⁾ Dr. G. A. Venema, Proeve eener statistiek van den landbouw der gemeente Winschoten over 1859, Tegenw. St. II, 233.

²⁾ Vergel. C. J. Geertsema, p. 101.

³⁾ Inleiding op deel I.

⁴⁾ Landhuishoudkundige Flora.

⁵⁾ Tijdschrift van Nijverheid XV, 388.

⁶⁾ Handboek voor den Nederlandschen Landbouw en Veetselt.

Het is echter gemakkelijker om onderzoekingen omtrent het plantenkleed in te stellen, dan omtrent de bodemgesteldheid, de bewoners toch zijn veel meer op de hoogte van den plantengroei, dan van de grondsoort in hun land, wanneer men niet te hooge wetenschappelijke eischen stelt. Behalve dat de tweede kaart 1) ons doel is, wat een reden tot grootere nauwkeurigheid kan zijn, werd die ook verkregen door bovengenoemde oorzaak. Het spreekt van zelf, dat veranderingen in de plantenwereld over zeer kleine uitgestrektheden zijn weggelaten, omdat wij bij inteekening misschien een grooter fout maakten dan door veronachtzaming. Voor het aanduiden der verschillende plantensoorten zijn verschillende schakeringen van groen gebruikt, omdat die kleur ons daartoe het meest geschikt voorkomt en omdat bij Engler 2) een soortgelijke kaart is gegeven 3).

Het doel van deze kaarten is om het verband, dat er bestaat tusschen plantengroei en bodemgesteldheid in Westerwolde, aan te wijzen. Waar eene intensieve bodemcultuur de plantengroei niet geheel heeft veranderd, zien wij steeds dat zij van de bodemgesteldheid afhankelijk is. Op hoogveen vindt men slechts heide, wollegras, biezen, mossen en boekweitvelden; lage venen zijn steeds weilanden; zandgronden, waar die over zekere uitgestrektheid hoog liggen, zijn roggevelden, overigens

¹⁾ Bij bovengenoemde statistiek van den landbouw in de gemeente Winschoten door G. A. Venema, geeft hij eene geologische kaart, omdat, zooals hij zegt op pag. 234:

van dit beginsel (dat de agronomische indeeling van de geologische afhangt) uitgaande, het duidelijk is, dat de geologische kaart tevens aan eene agronomische beantwoordt."

G. J. Geertsema, die bij zijne beschrijving van den landbouw in de distrikten Oldambt, Westerwolde en Fivelgo, eene agronomische kaart alleen geeft, onderscheidt in Westerwolde alleen oergronden, gecultiveerden zandgrond en woesten grond. Deze onderscheiding is te onbepaald. Esschen en toegemaakte dalgronden, gecultiveerde hooge venen en bebouwde lage venen worden alle gerekend tot gecultiveerde zandgronden. Langs het ter Apel-kanaal en Stadskanaal geeft hij reeds overal gecultiveerden zandgrond aan, terwijl tegenwoordig een gedeelte nog niet is toegemaakt, en rondom de dorpen, vooral in het noorden, teekent hij te veel woesten grond. Onder oergrond verstaat hij blijkbaar hooiland, maar dan was het beter dit zoo te noemen.

In Venema en Geertsema treffen wij dus twee uitersten aan, de een geeft alleen eene geologische kaart, de andere eene agronomische, al tracht hij daarop ook eenigezins bodemgesteldheld en cultuur aan te duiden. Omdat, zoodra de mensch een streek bewoont, hij den bodem verschillend gebruikt, al blijft hij daarbij van zijne formatie afhankelijk, hebben wij gemeend twee kaarten naast elkaar te moeten geven. daarbij trachtende aan te wijzen, hoe de tweede van de eerste afhankelijk is.

²⁾ Versuch einer Entwicklungsgeschichte der Pflanzenwelt.

³⁾ Bij het afwerken der kaarten is hierin buiten ons toedoen verandering gebracht.

dorre weilanden met schraal gras en heide, hier en daar met mos beplant; het scandinavisch diluvium ligt ôf hoog en is dan esch, ôf laag en is dan bedekt met een weinig darg, waarop gras groeit; in cultuur gebracht hoogveen komt overeen met esschen, terwijl afgegraven hoogveen, zoodra het toegemaakt is, in akkers, waarop wisselbouw wordt gedreven, is veranderd. Dit is in korte trekken eene beschrijving van de beide kaarten.

Daar de geologische formatie der venen in zoo eng verband staat met den plantengroei daarop, vinden wij een bron voor de vegetatie der venen in Staring. Het spreekt van zelf, dat de plantenwereld der hooge venen niet overal gelijk kan zijn, omdat zij in het midden veel water bevatten en meestal door een strook moerasveen omringd worden 1), zooals ook op onze kaart is aangegeven. Voor het geval de hooge venen in natuurlijken toestand verkeeren, vindt men de plantengroei nauwkeurig verklaard bij Staring 2). Zij zijn echter op Westerwolde alle op gruppels gelegd en het vochtige middengedeelte, waar wilde gerst (Narthecium ossifragum 3), wollegras (Eriophoron vaginatum en angustifolium 4), witte grasbies (Rhynchospora alba 5) en veenmos (Sphagnum cymbifolium 6) groeien, onbreekt hier. Waar het plantenkleed niet is afgebrand ter wille van den verbouw van boekweit, bestaat zij overwegend uit heide (Calluna vulgaris en Erica tetralix⁷), waarin dan vooral in de vochtige plaatsen tusschen de belten bovengenoemde planten groeien. In eene studie over de heideplant) zegt G. A. Venema, dat de struikheide alleen in de venen kan groeien, wanneer hare wortel zomer en winter vrij blijft van water, dat, zoo die 's winters in water staat, zij plaats maakt voor dopheide, die echter ook verdwijnt, wanneer de bodem zoowel 's zomers als 's winters zeer vochtig is.

Het hoogveen in Westerwolde ligt reeds meest op gruppels, het is dus drooggelegd en daarom is de struikheide de meest voorkomende plant, de dopheide groeit dan in kleine laagten 9).

¹⁾ G. Reinders, Ned. landb. en veeteelt, I, pag. 10 en 35.

²⁾ B. v. N. I, pag. 102. Staring is hier een secondaire bron; hij zegt geput te hebben uit Venema, Over hooge Venen en Veenbranden.

⁸⁾ Oudemans III, 178.

⁴⁾ Van Hall, p. 285. Vergel. ook Dr. Hugo de Vries, de Peel, pag. 10.

⁵⁾ Van Hall, 232.

⁶⁾ Dr. Hugo de Vries, p. 10.

⁷⁾ Oudemans II, 268; Dr. Hugo de Vries, p. 9.

⁸⁾ Tijdschrift van Nijverheid XV, p. 893.

⁹⁾ Pag. 898 aldaar.

Bijna al deze venen worden tijdelijk in boekweitvelden veranderd. Gedurende 4-6 jaar wordt in het voorjaar veen gebrand en dan boekweit gezaaid 1). Daarna moet het 25-30 jaar braak liggen, wanneer het niet dient als schapenweide, en 40-50 jaar, wanneer het wel daartoe wordt gebruikt 2). Nu groeit op het veen, dat door het branden lager is geworden en daardoor vochtiger, eerst dopheide en later struikheide, welk verschijnsel ook wordt waargenomen na het plaggensteken. In den toestand, waarin de Westerwoldsche venen tegenwoordig verkeeren, is in de vegetatie dus eene aswisseling van dopheide, struikheide en boekweit. Verschillende plaatsen hebben daarom een verschillend plantenkleed, maar omdat deze planten elkaar regelmatig opvolgen, vormen zij als het ware één geheel, weshalve zij op de kaart met één kleur zijn aangegeven. Eene verdeeling hiervan in driëen zou zeer moeilijk zijn, en bovendien weinig waarde hebben, omdat daarin elk jaar verandering komt. Waar de hooge venen reeds zijn aangesneden, zooals in de Fledder, is van deze plantbedekking geen sprake meer; de turf, die in den zomer op het heideveld staat te drogen, belet allen plantengroei en laat, wanneer hij in het najaar is weggevoerd, een kaal en dor landschap achter 3).

Boven is reeds gezegd, dat de plantenwereld op laag- en moerasveen bestond uit gras; alle lage venen in Westerwolde zijn weide- en hooilanden 4). Hierbij rijst als van zelf de vraag op, of dit noodzakelijk is, of de lage venen niet voor landbouw geschikt zijn. Door sterke bemesting met wiergrond en Dollardslib of klei kunnen deze weiden in uitstekend bouwland worden veranderd 5) en dan past men daar eene vruchtwisseling toe, die overeenkomt met die op roodoorngronden 6). Maar daartoe moeten zij worden drooggelegd om ze in den winter boven water te houden en kanalen dienen gegraven te worden tot aanvoer van klei. De moerasvenen aan de Duitsche grens bestaan bijna geheel

¹⁾ Reinders I, 302. Venema geeft den duur van 6-8 jaar op, waarop dan nog eene bebouwing van wilde spurrie volgt. T. v. Nijv. XV, 396.

Vergel, ook Dr. Hugo de Vries, p. 6 en C. J. Geertsema, p. 102.

²⁾ Venema aldaar 397; vergel. ook C. J. Geertsema, p. 121.

³⁾ Eene beschrijving van eene vervening vindt men o. a. bij Dr. Hugo de Vries, pag. 29.

⁴⁾ Vergel. ook C. J. Geertsema, p. 100.

⁵⁾ Vergel. Reinders I, 9.

Vergel. Dr. J. M. van Bemmelen, Bouwstoffen tot de kennis van de kleigronden der prov. Gron., p. 125.

uit weilanden, waaraan door de verschillende soorten van zegge, vooral de carex panicea 1) eene blauwe kleur wordt gegeven.

In de Mussel treft men een onafzienbaar veld van weilanden aan, nu eens door slooten in stukken van een paar bunder verdeeld, dan weer liggend in uitgestrekte velden, waar kudden koeien door een herdersjongen worden bewaakt. Hier en daar worden zij afgewisseld door hooilanden, wier kleur wordt beheerscht door het gemeene struisgras (Agrostis vulgaris 2) en rood zwenkgras (Festuca rubra 3) en waarop het reukgras (Holcus odoratus 4) veel voorkomt. Langs de oevers der riviertje, vooral waar die verder naar het noorden een breed winterbed hebben, dat in den zomer droog is, vindt men slechts hooilanden. Ook andere drassige gronden worden daartoe gebruikt, zoo o. a. de Vledderkampen bij Vlachtwedde. Bij uitzondering alleen zijn er hooilanden zoo hoog gelegen, dat zij ook als bouwland zouden kunnen worden gebruikt en dan komen zij ook nu en dan onder de ploeg. Deze laatste, die in den winter niet onder water staan, worden voor de beste gehouden en men betaalt ze bij verkoop met meer geld, dan de beste gedeelten van een esch.

Eentooniger nog en vooral treuriger is het landschap, dat zich voor onze oogen ontrolt, wanneer wij de hooge en lage venen hebben verlaten en de diluviale zandgronden doorwandelen. Voor zoover zij rondom de dorpjes en gehuchten zijn gelegen 5) en dientengevolge wegens hunne hooge ligging in bouwland zijn veranderd, vertoonen zij een ander beeld, waarvan later zal worden gesproken. Maar wanneer zij zich op eenigen afstand van de menschelijke woningen bevinden, zijn ze dorre graslanden en schrale heidevelden. Aan de wegen langs de Ruiten-Aa van ter Apel tot Wedde zijn ze begroeid met dor gras, dat slechts in den voorzomer een kleur heeft, die op groen gelijkt. Het gras staat bij stammen, die 2—4 dM. hoog zijn, waartusschen overal de grijs-witte zandboden zichtbaar is. Bevindt zich hier of daar eene laagte, waarin 's winten veel water staat en die in den zomer ook niet altijd droog is, dan wordt het gras groener en een dicht kleed bedekt den bodem. Het is reeds hieraan duidelijk zichtbaar, dat op die plaatsen eenig moerasveen is ge

¹⁾ Van Hall, 238.

²⁾ Van Hall, 252.

³⁾ Aldaar 266.

^{4) - 255.}

⁵⁾ Vergel. C. J. Geertsema, Beschrijving van den landbouw in de districten Oldambt, Westerwolde en Fivelgo, p. 94.

rormd. Ook de stroompjes en beekjes, die deze weiden doorstroomen, of de verlatene beddingen daarvan verschaffen eenige afwisseling. Gaat nen van de wegen langs de Ruiten-Aa in oostelijke richting naar de nooge venen, dan wordt het gras meer en meer verdrongen door de ieideplant. Over het algemeen genomen mag men zeggen, dat ten zuiden van Sellingen het dorre gras de toon aangevende plant is, en dat ten noorden van die plaats de struikheide op den voorgrond treedt.

De zandgronden tusschen de beide bronrivieren van de Westerwoldsche Aa hebben ongeveer hetzelfde voorkomen als de weiden aan de postzijde van de Ruiten-Aa; alleen is het terrein daar meer golvend, er zijn meer laagten, waarin veen is gevormd en het dorre gras maakt daar meestal plaats voor de heideplant. Aan de oostzijde treft men op eenige plaatsen zandstuivingen aan en de vegetatie is daar zeer schraal, aan de westzijde gaan ze over in de darggronden van de Mussel met weligen grasgroei. De struikheide is hier echter kleiner dan op de hooge venen, omdat de bodem droger is en omdat dadelijk onder de laag grijs zand dikwijls oerbanken zijn gelegen 1). Op enkele plaatsen is de struikheide afgebrand en op den aldus gemesten bodem wordt boekweit gezaaid, maar deze staat in opbrengst verre ten achteren bij de veenboekweit 2).

Al deze zandgronden heeten marken, welke naam nog is blijven bestaan na de verdeeling daarvan. Zij worden alleen gebruikt tot weide ler kudden koeien en schapen en zij worden door de eigenaars zoo weinig geteld, dat bijna geen enkele boer weet, hoeveel hij van deze martengronden bezit ³).

Het zij ons veroorloofd aan deze beschrijving eene opmerking van enigszins anderen aard toe te voegen. De stad Groningen heeft op soorelijke gronden, die zij bij ter Apel bezit, met zeer goed gevolg eiken dennebosschen aangelegd. Ook in andere deelen van Westerwolde is nen overtuigd, dat die bosschen daar welig zouden tieren en toch komt nen er niet toe aanplantingen aan te leggen, ofschoon de grond nu zoo joed als niets oplevert en geringe waarde heeft 4). Had nu de verdee-

¹⁾ G. A. Venema, Tijdschr. voor Nijverh. XV, 393: "Daar nu veengrond beter ocht houdt, dan zandgrond, mag men hier wel de oorzaak zoeken, waarom de veenkruikheide zoo snel groeit en zoo welig opschiet, dat zij om de 3 of 4 jaar door de ezembinders kan gesneden worden, terwijl de zandstruikheide daarvoor ten minste en groei van 15—20 jaar noodig heeft.

²⁾ Mededeeling van den heer Boels, landbouwer te Onstwedde.

³⁾ Vergel. C. J. Geertsema, p. 100.

⁴⁾ Vergel. ook C. J. Geertsema, p. 117, waar hij zegt: "Verreweg de grootste op-

ling niet plaats gehad, zoo zou een krachtig burgemeester zijn invloed hebben kunnen aanwenden om dennen te planten, op die wijze den grond productief te maken en te verbeteren 1). Wij wenschen daarmee uit te drukken, dat wij het nut der markenverdeeling niet inzien, zoolang Westerwolde niet gekanaliseerd is 2) en geen meststoffen kunnen aangevoerd worden, die onmisbaar zijn voor de landontginning.

De oostelijke helft der dal- d. z. afgegraven gronden, daar, waar zij aan de hooge en lage venen of aan het zanddiluvium aansluiten, zijn nog niet toegemaakt. De bonkaarde is over den ondergrond geworpen en omdat zij door de nabijheid der wijken zeer droog is, bedekt zij zich in korten tijd met reusachtige stammen van struikheide.

Alle tot nog toe beschrevene gronden zou men kunnen rekenen tot de woeste gronden, indien men daarvan slechts uitzondert de hooilanden aan de rivieren en enkele goede weilanden in de Mussel. Bovendien dient men in het oog te houden, dat ook de hooge venen nu en dan in boekweitvelden worden veranderd en dat enkele zandgronden soms een dergelijke verandering ondergaan.

Boven in het eerste gedeelte van deze studie zijn reeds tal van bewijzen aangehaald voor de boschrijkheid van Westerwolde in vroegere jaren. De kaart van Beckering, die in de tweede helft van de vorige eeuw is vervaardigd en die bekend is om hare nauwkeurigheid 3), geeft niet meer bosch aan dan er tegenwoordig is. De boschrijkheid moet dus reeds vroeger zijn verdwenen, misschien wel door vernieling op groote schaal in den strijd der Addinga's tegen de stad Groningen 4). In den omtrek

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pervlakte gronds zal waarschijnlijk zoo woest en onvruchtbaar blijven, totdat die verre afstand de ontginning niet meer zal verhinderen.

Hierdoor toch zou een laagje humus of veen ontstaan, die met zand vermengd een uitstekenden bouwgrond oplevert.

Vergel. Dr. Hugo de Vries, de Peel, p. 14. Dit wordt ook aangeraden door C. J. Geertsema, p. 125.

²⁾ Vergel. C. J. Geertsema, p. 96.

³⁾ Wanneer men deze kaart vergelijkt met de Stafkaart, vindt men slechte geringe afwijkingen, bijna alleen in den loop der beekjes. Deze vormen echter meest sterke serpentinen, die dikwijls doorbroken of doorgraven worden, zoodat hun loop in kortes tijd groote veranderingen kan ondergaan. Daar zij zeer klein zijn en dikwijls arm saa water, is het mogelijk ze te vergraven en op die wijze geheel te doen verdwijnen. Bij het zien van een kronkelend stuk weiland in een heideveld kwam meer dan eens de gedachte bij ons op, dat daar vroeger een beekje moest zijn geweest.

⁴⁾ Vergel. Mr. R. Fruin, Geschiedenis van Westerwolde, op verschillende plaatses. In eene kaartenverzameling van wijlen Mr. Bakker, die nu toebehoort san Jhr. Mr.

van ter Apel heeft de stad Groningen op hare bezittingen in den laatsten tijd weer bosschen van eiken (Quercus pedunculata) 1) en dennen (Pinus sylvestris) 2) aangeplant en deze cultuur is uitstekend geslaagd. Een eigenlijk bosch is er ook nog ten oosten van Wessinghuizen, maar gedeeltelijk is het reeds omgehakt en het overige zal in weinige jaren verdwijnen. Dit bestaat ook uit dennen en eiken met beuken (Fagus sylvatica) en esschen (Fraxinus excelsior) daartusschen. De geheele streek van Veele tot Jipsingehuizen is zeer boschrijk; maar eigenlijke bosschen worden er niet gevonden. Toch staan de boomen er zoo dicht om en in de hooilanden, vooral in het Broek bij Weende, dat wij meenden meer recht te hebben deze geheele streek op onze kaart als bosch dan als weiland aan te geven. De boomen groeien zeer welig, zij bereiken eene groote hoogte en kunnen, wanneer zij eenigszins vrij staan, veel kruin hebben.

Om de weilanden en langs de wegen treft men naast eiken veel berken (Betula verrucosa) 3) en elzen (Alnus glutinosa) 4) aan, die ook alleen de bouwlanden omringen en dan geplant zijn op de dijkjes langs de slooten. In de schaduw van deze boomen groeien in de velden tusschen Veele en Sellingen tallooze braamstruiken (Rubus in verschillende soorten) 5), die de kanten der wegen en de wallen der slooten bedekken.

Overigens is er in Westerwolde alleen bosch rondom en in de dorpen, iedere boerenwoning ligt daarin verscholen en de breede pleinen en wegen daartusschen zijn er mee beplant. Afgelegen hoekjes van bouwland, dat men moeilijk kan bearbeiden, zijn hier en daar ook met dennen beplant; maar overigens is Westerwolde kaal en herinnert slechts door zijn naam en het kienhout in de venen aan vroegere boschrijkheid.

Het oosten is veel boschrijker, dan het westen, in de Mussel ziet men bijna geen enkelen boom over groote uitgestrektheid, wat echter in de nabijheid van Onstwedde beter wordt. Aan de oostzijde van den straatweg bij Veenhuizen ligt een uitgestrekt weiland, dat doorweven is met

R. de Marees van Swinderen, is eene kaart van Cornelus Pijnacker (N°. 57) Amsterdam F. de Wit, zonder jaartal, maar waarschijnlijk uit de 18e eeuw, die alleen bosch aangeest bij ter Apel, N.O. daarvan bij Lauderbrouck, Z.O. van ter Maarsch en bij Pekela, dus in streken, waar nu nog slechts gedeeltelijk bosch voorkomt, terwijl dan op andere plaatsen later boomen zijn aangeplant.

Eene kaart van den commandant van Bourtange A. D. G. de Gross, opgedragen aan den stadhouder (N°. XXXIX aldaar) geeft in Westerwolde geen bosch aan.

¹⁾ Oudemans III, 62.

²⁾ Pag. 91 aldaar.

³⁾ Oudemans III, 79.

⁴⁾ Pag. 82 aldaar.

⁵⁾ Oudemans II, 56.

rijen boomen, die in het midden zoo dicht staan, dat ze werkelijk een bosch vormen. Ook bij ter Maarsch zijn vele en hooge boomen; overigens echter vindt men ze hier slechts langs het noordelijk deel van de Mussel-Aa.

Terwijl bovengenoemde woeste gronden en bosschen het grootste deel van den bodem innemen, blijft er slechts weinig grond over voor den landbouw. En wanneer nu nog de bodem hier en daar wordt bebouwd, geschiedt dit evenwel op de meest verschillende wijzen, al naardat bij bestaat uit diluviaal zand, uit dalgrond of uit zeeklei.

Van de samenstelling en vorm der rogge-esschen is reeds het een en ander gezegd in het eerste gedeelte dezer studie. Daar werd reeds meegedeeld, dat door bemesting met plaggen de bodem wordt opgehoogd, en wij voegen hier er bij, dat op die wijze niet zelden een laag humus ontstaat van 1/2-1 M. De plant, die men bijna uitsluitend op de esschen ziet, is de rogge (Secale cereale) 1). Jaar in jaar uit wordt zij gebouwd 2), waarbij zij tengevolge van de jaarlijksche bemesting met plaggen, dikwijls welig groeit en goede oogsten oplevert. Slechts een enkele maal wordt de rogge door aardappelen vervangen en dan begint het volgende jaar hare teelt weder opnieuw. Is in het midden van Augustus de rogge van het land gehaald, dan wordt als voedergewas spurrie gezaaid, een enkelen keer ook knollen. Rogge geeft koren als voedsel voor mensch en dier, stroo voor de koeien, die behalve om de melk ook worden gehouden voor de bemesting van den esch. De aardappelen geven ook voedsel; aan uitvoer van beide producten kan niet worden gedacht, daar de verkeersmiddelen er toe ontbreken. Een enkelen keer ziet men tusschen de roggeakkers een klein veld haver of gerst, die echter in het zuiden slechts zelden voorkomen, maar naar het noorden menigwuldige optreden.

Is nu de esch van eene bepaalde bodemgesteldheid afhankelijk? Wordt het aantal bunders daarvan nooit uitgebreid? Beide vragen moeten ontkennend worden beantwoord. De uitgestrektheid van een esch is eenvoudig afhankelijk van de droogte van den bodem en van de hoeveelheid koeien, die kunnen worden gehouden. Wanneer men geen mest heeft, kan men met den bodem niets aanvangen en daarom bebouwt men slecht zooveel land, als men kan bemesten. Kan een dorp meer mest maks

¹⁾ G. Reinders II, 15.

²⁾ Vergel. C. J. Geertsema, p. 94 en 109.

dan noodig is voor de bebouwing van den esch, maar kan laatstgenoemde niet worden uitgebreid tengevolge van wateroverlast, zoo is het mogelijk door drooglegging het bouwland te vergrooten. Dit schijnt het geval te zijn met de Huttenstreek bij Onstwedde 1).

De cultuur op hoogveen is ongeveer gelijk aan den landbouw op den esch, waarom zij ook met dezelfde kleur op de kaart is aangeduid. Over het algemeen echter is zij jonger: het bouwen op de hooge zandgronden zal zeer oud zijn, daar de dorpen op Westerwolde reeds in het Karolingisch tijdvak voorkomen 2); dat op de randen van hooge venen vereischte echter eerst eene drooglegging en is vooral op Westerwolde van jongen datum, omdat het juist daar bestaat, waar de vervening op groote schaal is gedreven. Deze cultuur is daar aangelegd, waar de geringe dikte van het veen de kosten der vergraving niet toeliet. Zij is dezelfde als de veenbouten-cultuur in Oldambt, en te Veenhuizen en elders spreekt men ook werkelijk van bouten. Wij wijzen er echter op, dat deze wijze van bebouwing niet dezelfde is als de zoogenaamde veen-damcultuur 3), hoewel zij uit dezelfde geologische eigenaardigheden is voortgekomen. De bovenste veenlaag wordt losgehakt, met zand vermengd, vervolgens gemest en dan is het land geschikt tot het zaaien van rogge. Ligt zulk een stuk land ver van het water, zoo verbouwt men elk jaar rogge en slechts een enkelen keer aardappelen, is het aan een kanaal gelegen, dan worden de aardappelen hoofdproduct en die worden vervoerd naar de fabrieken in de veenkoloniën. Groen land vindt men hier nooit, omdat de bodem daarvoor te droog is.

Geheel verschillend van de cultuur op bouten is die op dalgronden, die in het westelijk en nog meer in het noordwestelijk deel van Westerwolde reeds zijn toegemaakt en in uitstekend bouwland veranderd. Het ligt voor de hand, dat de wijze van aanleg der venerijen grooten invloed uitoefent op den verbouw der producten (zoo is de intensieve aardappelencultuur alleen mogelijk op landen, die door tallooze kanalen zijn doorsneden), maar hierover heeft Dr. Venema een paar zulke fraaie artikelen geschreven, dat wij slechts daarnaar behoeven te verwij-

¹⁾ De gronden, die in het eerste deel van deze studie tot het Scandinavisch diluvium zijn gerekend, worden, voor zoover zij hoog zijn gelegen, bebouwd als de esschen, wanneer zij echter laag zijn en door een weinig moerasveen worden bedekt, zijn zij hooilanden.

²⁾ Vergel. Fruin, Geschiedenis van Westerwolde, Sparsim.

³⁾ Zie daarover G. Reinders I, 304.

zen 1). Ook zou eene beschrijving daarvan ons te ver van ons onderwep afbrengen. Behalve in Groningen komen deze bouwlanden op dalgrond voor in de Peel, waar naast rogge veel vlas wordt verbouwd, dat in de Groningsche veenkolonien ontbreekt 2).

De bonkaarde der vergraven hooge venen wordt over de dallen verspreid, met één d.M. zand, dat uit de wijken is gegraven, bedekt, dan eenige malen geploegd en vervolgens gemest met Groninger stratendrek, "In het eerste jaar wordt rogge gezaaid en hierin klaver, waarna het eenige jaren groen blijft liggen, of men teelt het tweede jaar erwten, daarna weder rogge en hierin klaver, of ook worden wel het eerste jaar, na een zwakkere bemesting, aardappelen geteeld en daarna klaver of erwten 3)." Spoedig echter worden de aardappelen het hoofdproduct, zij worden soms 2, 3 en 4 jaren achtereen op hetzelfde stuk land verbouwd en leveren dan bij goede oogsten tengevolge van intensieve bemesting 4—500 HL. per HA. op 4). Slechts om den bodem niet te zeer uit te putten en om veevoeder te hebben teelt men rogge, gerst, haver en peulvruchten en laat het land nu en dan een paar jaar groen liggen om het te maaien of te weiden. Op deze wijze krijgt men op verre na niet die opbrengsten, die aardappelen geven.

Op het noordelijk gedeelte van het land, dat wij beschrijven, komt nog een stukje roodoornklei voor. Voor zoover het ligt binnen den dijk van de Westerwoldsche Aa, is het onderhevig aan den gewonen wisselbouw op roodoorn. Van Bemmelen 5) geeft voor de vruchtwisseling op de roodoorngronden van Winschoten, waartoe deze behooren, het volgende op: 3—4 jaren groen ligging, 2 jaar dikke haver, rogge met bemesting, witte klaver met zaaigras, waarna de grond aldus 3—4 jaren groen blijft liggen; of het 4de jaar braken, dan koolzaad, rogge, of tarwe, witte klaver en Engelsch raaigras, om weer 3—4 jaar groen te laten

¹⁾ G. A. Venema, De venen en de veenkoloniën in de prov. Groningen. Tegenv. Staat III, pag. 261-319 en 365-456. Ook de anthropo-geograaf vindt daarin veel voor den aanleg der dorpen in de veenderijen, ofschoon de geleerde schrijver zich mest op technisch dan op anthropo-geographisch standpunt plaatst.

²⁾ Dr. Hugo de Vries, p. 30.

³⁾ G. Reinders I, 304.

⁴⁾ Neemt men als gemiddelde prijs van één HL. aardappelen 1 Gld aan, zoo krist men een bruto opbrengst van 400 Gld.

⁵⁾ Bouwstoffen tot de kennis van de kleigronden der prov. Groningen. Hier worden zoowel de gegevens van andere schrijvers als de wisselbouw van andere streke vermeld.

liggen. Ofschoon nu, sedert van Bemmelen dit schreef, wel eenige verandering is aangebracht, o. a. door de cultuur van erwten, is de hoofdzaak toch hetzelfde gebleven.

Aangenaam was het ons, toen wij deze studie reeds bijna hadden voltooid, te lezen 1), dat de heer Dr. Blink er bij het bestuur van het Aardrijkskundig Genootschap op heeft aangedrongen eene verbeterde geologische-agronomische kaart voor te bereiden. Evenals Dr. Blink werden wij door de discussien in de Koninklijke Academie aan het werk gezet en wij namen daartoe een gedeelte van Nederland, dat ons daartoe zeer geschikt voorkwam en nog weinig bekend is. Wel zijn wij overtuigd, dat wij eenige fouten hebben gemaakt, daar wij elk plekje niet konden bezoeken, maar wij meenen toch eenig beeld van het geheel te hebben gegeven.

Meeden, September '89.

¹⁾ Nieuwe Rotterdamsche Courant van 19 Sept. 1889, blad 2, Wetenschappelijke Berichten.

EENE DIENSTREIS VAN AMBOINA NAAR DE NOORDKUST VAN CERAM

DOOR

C. ROGGE.

Reeds lang was ik voornemens eene dienstreis te ondernemen naar onze Inlandsche Christengemeenten in de baai van Sleman aan de Nkust van Ceram, vooral omdat ik eene dringende uitnoodiging gekregen had om in Wahaay, waar een militair kommandant tevens civiel gezaghebber is gevestigd, eenige kinderen te doopen. Ik moest echter eene gunstige gelegenheid afwachten om met een gouvernements stoomschip daarheen te gaan, daar zoo'n reis met een orembaai te gevaarlijk is. Welk jaargetijde men ook kiest om van Ambon naar de N.-kust van Ceram te gaan, altijd bestaat er ôf aan de Z.-kust ôf aan de N.-kust van Ceram gevaar voor hevige branding, daar in de Oostmoesson de Banda-zee, vooral in den omtrek van de baai van Fanoenoe, door den Oostewind wordt opgezweept tot hooge golven en in de Westmoesson de zee aan de N.-kust van Ceram hoogst onstuimig is. Ik bleef dus wachten totdat de landraad in Wahaay zitting moest houden, ten einde met het gouvernements stoomschip "de Arend" mede te kunnen gaan.

Reeds vroeger had ik, bij eene dienstreis naar Saparoea, ondervonden, dat ook een stoomschip veel ongeriefelijks heeft. Daargelaten dat dit stoomschip bij de minste deining als een hobbelpaard op het water schommelt, zoodat ieder die van zeeziekte last heeft het terstond te kwaaf krijgt, zijn de passagiershutten eene verdieping lager dan die van der resident en den gezaghebber gelegen, zoodat de zwaluwpoortjes nooit geopend kunnen worden, omdat zij met de waterlijn gelijk liggen en de luchtververschingen alleen door een langen luchtkoker geschiedt. Met gaf die benauwde, donkere hutten dan ook den bijnaam van schoeneshokken, en waarlijk, zij zijn beter geschikt tot bergplaats van goedere dan voor logies. Meestal kon ik 't dan ook beneden in mijn hut nie

uithouden en ging 's nachts liever in weer en wind mij op het dek in een luierstoel uitstrekken, met een plaid dicht om de leden, of vroeg ik den gezaghebber verlof op een bank in de salon te gaan slapen, waar ik echter door het gebons en geratel der schroef weinig rust vinden kon. Te vergeefs heb ik gezocht naar een rustig plekje om te overnachten of na de rijsttafel een middagslaapje te doen, want beneden in dat schoenenhok kreeg ik terstond een ondragelijke hoofdpijn. Nog veel minder aangenaam was zulk logies voor den president en den griffier van den landraad, die al zeer spoedig last kregen van zeeziekte, toen ons stoomschip allerlei sierlijke buigingen begon te maken.

Den 7den Augustus vertrokken wij dan per stoomschip naar Wahaay, doch moesten nog een omweg maken naar Saparoea, om daar den inspecteur van finantiën aan wal te brengen, een vroolijk man, die door zijn gezellig discours de zeezieke passagiers zocht op te beuren. Die reis was gelukkig heel voorspoedig, want om 6 u. 's morgens vertrokken zijnde, waren wij om 4 u. 's middags geankerd in de baai van Saparoea. Ik had niet veel lust aan wal te gaan, daar het geen lichte maan was en ik reeds vroeger ondervonden had, dat men met laag water allerlei moeilijkheden heest om weer aan boord te komen. Bovendien verwachtte ik wel, dat de hulpprediker van Saparoea aan boord zou komen, als hij van mijn komst hoorde. Werkelijk hoorden wij dan ook, toen de avond reeds gevallen was en wij door de dikke duisternis slechts enkele verlichte woningen aan den wal konden onderscheiden, den slag van een pagaai, en met een lantaarn zagen wij in het water, in onze onmiddellijke nabijheid, een vlerkpraauw met de hulppredikers van Saparoea en Noesa laut, die met hun beenen half in het water zaten, daar het ranke vaartuig, slechts uit een boomstam gehouwen, water geschept had. Het kostte veel moeite en zeemansvaardigheid om uit dat beweeglijk praauwtje goed en wel aan boord te komen. Ik was hun voor dat bezoek ook zeer erkentelijk, en de gezaghebber toonde zich, op mijn verzoek, bereid de heeren weder met een sloep aan den wal te laten brengen. Den volgenden morgen vroeg snoof en stampte "de Arend" reeds ongeduldig; de ankers werden gelicht en spoedig verlieten wij Saparoea, om weder terug langs Leitimor en Hitoe naar de Z.-kust van Ceram over te steken en door de straat van Manipa, langs de eilanden Manipa, Kelang en Boano en de N.-kust van Ceram, het doel van onze reis te bereiken. Wel hadden wij die reis wat korter kunnen maken door tusschen de eilanden en de kust van Ceram te stoomen; doch de avond begon te vallen en onze gezaghebber, een hoogst voorzichtig man, achtte het raadzamer

een omweg te maken, waardoor wij toevallig getuigen waren van een hevigen boschbrand in den omtrek van Kajeli op het eiland Boeroe, dien wij duidelijk van boord konden zien. Over 't algemeen hadden wij tamelijk goed weer en lag het stoomschip vrij stil op het water; doch daar men ons verzekerd had, dat men in dit jaargetijde aan de N.-kust van Ceram het schoonste weder van de wereld had, hoopten de heeren leden van den landraad den volgenden morgen aan dek te kunnen komen en te kunnen blijven. Intusschen had ik het 's nachts in dat schoenenhok niet kunnen uithouden en was met mijn plaid maar aan dek op een stoel gaan liggen, om door den koelen nachtwind van mijn hoofdpijn bevrijd te worden. Hierdoor was ik ooggetuige van een zonsopgang op zee, die in de tropen verrukkelijk schoon is. Al mijmerende zag ik aan de kim de dagvorstin in al hare majesteit verrijzen en een gouden regen werpen op de kabbelende golven. De wolken werden gescheurd en weken eerbiedig ter zijde, om plaats te maken voor de koningin des hemels, of verzamelden zich op de bergtoppen van Ceram's N.-kust, die duidelijker zichtbaar werden. Statig maar snel steeg de gloeiende vuurbol eerst rood dan schitterend goudgeel omhoog, en spoedig, te spoedig helaas, overgoot zij ook ons dek met hare gloeiende stralen. Doch wat wij hadden gehoopt gebeurde niet, want ofschoon er geen wind en de waterspiegel effen en glad was, vertoonde zich zulk eene deining in het water, dat het stoomschip alleen stampende en schommelende zijne reis kon vervolgen, hetgeen de passagiers nog zeezieker maakte. Het gezicht op de kust van Ceram was echter zeer interessant, want hooge bergen en rotsen, met zwaar hout tot aan de kruinen begroeid. lagen daar woest opeengestapeld, en vormden een lang en breed bolwerk. Veel aswisseling was er in dat gezicht echter niet, want nergens zagen wij tusschen dat dichte groen een blauw rookwolkje opstijgen, ten bewijze dat hier of daar eene negorij was, terwijl nergens een praauw was te bespeuren. Die schoone natuur was doodsch en stil, die kostbare bodem onbewoond.

Gelukkig kwamen wij nog vóór zonsondergang voor Wahaay; met veel zeemanskunst sloop het stoomschip door de kronkelende geul en werd met zware trossen aan de brug vastgemeerd. Natuurlijk was de bevolking, op het gezicht van de boot, reeds op de brug, en met nieuwsgierige blikken wachtten de kommandant- en de luitenant, met hunne echtgenooten, het oogenblik af om aan boord te kunnen komen ten einde de aangekomen passagiers te begroeten. Werkelijk eene groote gebeurtenis voor hen, die soms in drie of meer maanden geen stoomschip te zien

krijgen en op zoo'n eenzame post bijna geen asleiding hebben. Met de meeste hartelijkheid werden wij dan ook ontvangen, en weldra zaten wij in druk gesprek in de voorgalerij van de ruime, met atap gedekte, woning van den kommandant Boot, waar wij gedurende ons verblijf in Wahaay bleven logeeren. Met de meeste nieuwsgierigheid luisterden onze vriendelijke gastheer en gastvrouw naar de nieuwtjes, die wij uit Ambon meebrachten, en menig verhaal werd met een hartelijk gelach of "hoe is het mogelijk!" "wel, dat is aardig!" "dat had ik niet gedacht!" enz. afgebroken. Naar promoties en overplaatsingen werd in het bijzonder gesnformeerd en op dat gebied konden wij hun vele verrassende tijdingen geven. Ook over mijn voorgenomen reisplan om de Inlandsche Christengemeente in de baai van Sleman te bezoeken en verder naar Latea te gaan werd gesproken en bepaald, dat ik den volgenden morgen eens de orembaai van den kommandant zou gaan inspecteeren, om met dat vaartuig mijn voorgenomen bezoeken aan die gemeenten af te leggen.

De landraad meende een veertien dagen wel noodig te zullen hebben om al de getuigen op te roepen en te ondervragen in eene uitgebreide moordzaak van den Pattih van kampong Bessih, die ruim een jaar gevangen zat en niet één maar verscheidene personen, op zijne lastgeving, had om het leven doen brengen, maar tot nog toe wegens onvoldoende bewijzen, de twijfelmoedigheid en de vrees zijner handlangers aan het gerecht was ontkomen. Om echter die rechtszaak te bespoedigen en het grootste aantal der voornaamste getuigen zoo spoedig mogelijk op te roepen werden, nog in dienzelfden avond, door den kommandant de noodige beschikkingen genomen, zoodat reeds 's nachts een praam vertrok naar de verschillende negorijen, waar die getuigen woonachtig waren. Toch was het zeker, dat men nog wel drie of vier dagen op de komst dier getuigen zou moeten wachten. Ofschoon ik liever per stoomschip mijn reisplan had volvoerd, besloot ik, op de mededeeling van den gezaghebber, dat hij in dat geval geen kolen genoeg aan boord zou hebben om ons naar Ambon terug te brengen, van de ruime orembaai van den kommandant gebruik te maken, die ik den volgenden morgen van buiten en van binnen inspecteerde. De verzekering van den kommandant dat het eene sterke prauw was, die vast op het water lag, waarmede hijzelf al zijne dienstreizen langs de kust in zijne afdeeling deed, gaf mij voldoende gerustheid; ook het vreemde en ongewone van zoo'n zeereis had voor mij bijzondere aantrekkelijkheid. Een orembaai van die grootte met twee stevige korte vlerken op zijde, waar vier roeiers op konden zitten, had ik nog niet gezien, en het paviljoen, van binnen vrij ruim, met breede banken voor lig- en slaapplaats, zag er gezellig uit. Er werd dus afgesproken, dat de orembaai goed nagezien, schoongemaakt en opgetuigd zou worden en dat ik met dit vaartuig, bemand met 24 roeiers en een kapala-prauw of stuurman, Maandag 14 Augustus de reis naar de baai van Sleman zou maken. Ik had dus nog twee dagen verblijf, die ik besteedde om huisbezoek te doen en op Zondag godsdienstoefening te houden voor de Hollandsche gemeente.

Ik maakte mij hiervan echter geene groote voorstelling, want Wahaay vormde, met de kampongs Hatoewi en Hateling, slechts twee rijen woningen, allen van gaba gaba, aan een breeden kleiweg, die, hier en daar met steenen belegd, niet overal gelijk was en vooral in den regentijd voor voetgangers zeer lastig moest zijn. En met een smal pad langs het fort naar de brug, was dit letterlijk de eenige wandelweg. In ruim een kwartier kan men de heele plaats nauwkeurig bezichtigen; want achter, rechts en links van Wahaay, is het terrein heuvelachtig, met dichte bosschen begroeid, waardoor zich zeer ongelijke smalle voetpaden kronkelen, die voor een vreemdeling, op eenigen afstand van Wahaay, niet meer te onderscheiden zijn. De geheele bevolking van Wahaay, met die beide kampongs, telde niet meer dan duizend zielen, waarvan ongeveer een vijftigtal belijders van den Christelijken godsdienst waren; de overige zijn belijders van den Islam, meest allen van Ternate en Ambon, die ruilhandel met de Alifoeren uit het gebergte drijven. De eigenlijke bewoners van Ceram namelijk, de Alisoeren, die zich meer genegen toonen tot het Christendom dan tot den Islam over te gaan, zag men in Wahaay niet, daar zij in het gebergte of op verren afstand van het fort aan de kust kleine negorijen bewonen en alleen nu en dan vruchten en vogels in ruil voor mondbehoeften komen aanbieden.

De woning van den kommandant, met het kantoor en de militaire kantine aan de eene zijde en een met bamboe afgepaggerden tuin aan de andere zijde, lag aan den weg tegenover het exercitieveld en het fort, met een ruim uitzicht op de Ceramsche zee. De muren van het fort, niet hooger dan 1½ meter en naar het strand afhellende, schenen, uit de voorgalerij van de kommandantswoning bezien, zoo laag, dat men lust kreeg er met een goeden aanloop overheen te springen; bovendien zagen die muren er zoo oud en vervallen uit, dat men bij de oefeningen met de oude kanonnen zeer voorzichtig moest zijn, zou niet een gedeelte omvallen of instorten; ofschoon, naar ik vernam, de officieren dit niet zouden betreuren, omdat dan het oogenblik zou gekomen zijn voor het plaatsen van eene ijzerhouten palisadeering. Het ge-

heele fort, met die hoog boven de muren uitstekende met atap gedekte gebouwen, gaf niet het aanzien, dat men hier voor een geduchten vijand vreesde, maar erop gerekend had, met een enkel schot een aantal vijanden van schrik op de vlucht te kunnen jagen. De Alifoeren, overigens flinkgebouwde, sterke kerels, zijn dan ook vreesachtig en lafhartig, daar zij in hinderlagen en met eene groote overmacht hunne vijanden durven aanvallen, maar aanstonds op de vlucht slaan, als zij onraad hooren of slechts eenige vrees koesteren eene nederlaag te zullen lijden.

Binnen het fort zag het er veel beter uit; de verschillende gebouwen en magazijnen waren goed onderhouden, terwijl de wit- en verfkwast de gebreken van den ouderdom zorgvuldig had bedekt. In Hatoewi, waar de regent woonde, stond een mesdjid, maar eene Protestantsche kerk bestond er niet; want op zoo'n buitenpost was de komst van een predikant eene groote zeldzaamheid en een Inlandschen godsdienstonderwijzer vond ik hier evenmin. Het was ook juist om een nauwkeurig onderzoek in te stellen naar het aantal leden der Maleische gemeente, dat ik aan elk gezin een bezoek bracht, en aanteekening hield van hen die tot de Hollandsche of tot de Maleische gemeente behoorden, waardoor ik tot de ontdekking kwam, dat de Protestantsche gemeente 48 zielen telde, waarvan 32 behoorden tot de Maleische gemeente en het meerendeel der overige leden beter de Maleische- dan de Hollandsche taal sprak. Het waren Ambonneezen of Saparoeeezen, die als ambtenaars in verschillende betrekkingen daar werkzaam waren. Europeanen waren er dus zeer weinig: van het geheele garnizoen slechts vier manschappen, waarvan de helft nog tot de Katholieke kerk behoorde.

In het belang der Maleische gemeente trad ik al spoedig in overleg met den kommandant, om te Wahaay een inlandsch godsdienstonderwijzer te plaatsen, indien men wilde beloven voor eene woning en een geschikt lokaal, waar kerk en school kon worden gehouden, te zullen zorg dragen. Met groote ingenomenheid werd dit plan vernomen en de Maleische gemeente was dadelijk bereid krachtig mede te werken. Ik achtte de stichting dezer nieuwe gemeente niet alleen noodig voor de Ambonneezen, die aan hun godsdienst gehecht zijn, maar ook om tegenover de Mahomedanen pogingen in het werk te stellen, de Alifoeren tot het Christendom te bekeeren. Verder noodigde ik alle Christenen uit om de Hollandsche godsdienstoefening Zondagavond te komen bijwonen en de namen op te geven hunner kinderen, die zij wenschten gedoopt te zien. De militaire kantine, die tevens voor de ochtendzittingen van den landraad dienst deed, zou ook voor onze godsdienstige

samenkomsten worden ingericht, waartoe de kommandant de noodige bevelen gaf, opdat voor behoorlijke verlichting en zitplaatsen zou worden zorg gedragen. Er deed zich echter eene groote moeilijkheid voor, betreffende de vraag of aan het verlangen der familie van den kommandant, die zelf de zoon van een predikant was, zou kunnen worden voldaan, om bij die gelegenheid psalmen of gezangen te laten zingen, daar de Maleische gemeenteleden wel Hollandsch konden verstaan, maar niet zingen, en de gewoonte hadden bij hun kerkgezang de geheele toonladder bij iedere noot af te zingen. Een voorstel om hierbij de leiding van een viool of harmonica in te roepen, moest ik afkeuren, omdat mijns inziens de ware stichting daardoor niet zou worden verhoogd. Ik besloot het kerkgezang te beproeven door een zeer bekend psalmvers op te geven, dat in de beide talen Hollandsch en Maleisch zou kunnen worden gezongen; doch ook deze proef mislukte in de praktijk, want de gemeente raakte telkens zoo van de wijs, dat ik moeite had "het hijgend hert" van psalm 42 vs. 1. de jacht te doen ontkomen en naar de frissche waterstroomen te brengen. Bij die gelegenheid werden negen kinderen gedoopt. Ik nam mij echter terstond voor, als ik den volgenden Zondag nog in Wahaay zou zijn, voor de Maleische gemeenteleden afzonderlijk in hunne taal te preeken en bij die gelegenheid het avondmaal te bedienen. Dit voornemen vond gretig bijval, want men had sedert jaren geen Maleische preek gehoord en geen avondmaal kunnen vieren. Het deed mij groot genoegen, dat ik aan dat voornemen gevolg kon geven, want de stichting was er niet minder om, al ontbrak ook het zilveren avondmaals-servies en moest ik mij behelpen met gewone wijnglazen en porceleinen borden.

Zoo was dan Maandag 13 Augustus aangebroken, waarop ik s'avonds de reis naar de Slemanbaai zou ondernemen. Ik had uit Ambon, behalve de noodige mondbehoefte, ook een paar kisten kleedingstukken meegenomen, om onder de Alifoersche Christenen uit te deelen. De kommandant voegde hieraan nog de noodige flesschen drinkwater toe, daar het onraadzaam was het water in de negorijen te gebruiken. Er was dus 's morgens eene ongewone drukte aan huis, door het halen en nazien der tuigage en het brengen aan boord van de verschillende goederen; want ofschoon dat alles misschien in veel korter tijd had kunnen geschieden, kan men zich van de traagheid en onhandigheid der inlanders zelfs geen voorstelling maken, indien men dit niet met eigen oogen heeft aanschouwd. Om 5 uur was echter alles gereed en werd mij uitgeleide gedaan tot aan de brug, waar vele toeschouwers wachtten en de orem-

baai, getooid met drie Nederlandsche vlaggen en wimpel, zich vroolijk in den waterspiegel weerkaatste. Aan weerszijde der orembaai zaten reeds de roeiers of scheppers - want de kunst van roeien verstaan de inlanders niet - vier op elke vlerk en zes vóór en achter het paviljoen, terwijl er bovenop drie inlanders met twee tifas en een gong gereed waren eene oorverdoovende muziek te maken, om de scheppers in de bepaalde maat te houden en tot sneller slagen aan te sporen. Ook de roerganger stond op zijn post en de stuurman wachtte mij aan de plank af, die de verbinding uitmaakte tusschen de orembaai en de brug. De kommandant was zoo beleefd geweest een luierstoel op het paviljoen te laten zetten, waar ik in de onmiddellijke nabijheid der muzikanten, zoolang ik lust had, totdat de duisternis viel, kon plaats nemen. In ieder geval gaf ik hieraan de voorkeur, daar het binnen het paviljoen erg benauwd was. Spoedig ging ik aan boord, nam plaats op den luierstoel en weldra was ik, om het gouvernementsstoomschip heen, in de geul, toen de tifa's en gong het teeken gaven om met een geregelden slag te pagaaien. Dadelijk vielen de scheppers met een woest geschreeuw in, waardoor hooren en zien verging, terwijl mijne neusorganen bovendien onaangenaam werden geprikkeld door den stank van gedroogde visch en andere barang voor de reis, die de inlanders aan weerszijden boven het paviljoen hadden opgestapeld. Geruimen tijd duurde het, eer ik aan dat vreeslijk leven wennen kon, maar langzamerhand kreeg dat geluid iets eentoonigs en weemoedigs, zoodat het mij later in het paviljoen gemakkelijk viel gedurende den nacht in te dommelen, want hield dat lawaai boven mijn hoofd eensklaps op, dan werd ik uit den slaap plotseling wakker geschrikt. 's Morgens vroeg om 5 uur waren wij in de Slemanbaai en ankerden voor Sawaay, waar het gouvernement in vroeger jaren een klein garnizoen had. De dikke steenen muren van het kruithuis zijn de eenige overblijfselen van het vroegere fort. In de ochtendschemering kon ik slechts flauw land en bergen onderscheiden, maar toen dat donker gordijn langzaam werd opgetrokken, aanschouwde ik een natuurtafereel zóó schoon als ik nog zeldzaam in de tropen aanschouwd had. Vlak voor mij lag de negorij Sawaay aan de smalle bedding der baai tegen hooge rotsen, die tot aan de toppen met klapper- en kanarieboomen rijk begroeid waren. Bontgekleurde vogels, papegaaien, parkieten en kakatoeas hoorde ik rondom, bij het ontwaken der natuur, krassen en schreeuwen. Het kristalheldere, smaragdgroene zeewater wemelde van allerlei soort visch, zoodat ik er plezier in kreeg gedurende de weinige oogenblikken, dat wij daar stil hielden, telkens eenige korrels gekookte rijst in het water te strooien,

4 1

waarop een menigte visschen van allerlei kleur, blauw, rood en zilverwit boven kwamen en dartelend en spartelend elkander den aangeboden buit betwistten.

Nadat de roeiers een verkwikkend bad hadden genomen, vertrokken wij weder een uur later naar Paoeni, dat aan de andere zijde der bazi, die flauw te onderscheiden was, lag. Een uur of drie ver gingen wij langs de kust, omzoomd door hemelhooge rotswanden, die duidelijk deden zien, dat geweldige aardbevingen hier onpeilbaar diepe kraters hadden gevormd. Het werd mij allengs te vermoeiend om naar die woest opeengestapelde rotsen en bergen op te zien, waar klappertuinen de aanwezigheid van Alifoeren te kennen gaven. Het geluid der tifa's en gong weerkaatste tegen de rotswanden en de scheppers, getroffen misschien door die trotsche en indrukwekkende natuurtafereelen, schreeuwden en zongen er lustig op los, terwijl een der scheppers op vaardige wijze zijne roeispaan hoog in de lucht wierp om deze even snel op te vangen en geregeld den slag der anderen weder te volgen.

Toen wij de baai dwars overstaken, was de wind wat opgestoken en konden wij de zeilen weer gebruiken tot kort onder Paoeni. Meestal moet door de prauwen het naburige Wailoloo worden opgezocht, dat, gedekt door een onbewoond eiland, van de hevige branding geen last heeft. Nu daarentegen was het tamelijk stil weer en de stuurman oordeelde, dat ik te Paoeni wel aan wal kon komen. Daar had men reeds van verre mijne prauw met de vaderlandsche driekleur kunnen zien en hooren aankomen, terwijl de wimpel voor hen het bewijs was, dat een gouvernementsambtenaar aan boord was, de militaire kommandant of wel de predikant van Ambon, van wiens komst men te voren verwittigd was geworden door de oppassers van den militairen kommandant, die de getuigen in bovenmedegedeelde moordzaak waren gaan oproepen. Ik kon dan ook spoedig een dubbele rij in 't zwart gekleede inlanders onderscheiden, die zich niet ver van het strand hadden opgesteld, waartusschen de godsdienstonderwijzer heen en weer drentelde, gereed om, zooals ik dit reeds meermalen had ondervonden, bij mijne komst het sein te geven mij met kerkgezang te begroeten. Intusschen ging dat aan wal zetten nog zoo gemakkelijk niet. branding was in ieder geval nog te zwaar om zóó kort onder den wal te komen, dat ik droogvoets uitstappen kon, en het water te diep dan dat een paar kerels mij aan wal konden dragen, hetgeen meestal gebeurt. Er werd dus geroepen om eene kleine prauw, en met de meeste voorzichtigheid in een uitgekapten boomstam, want andere prauwen had

men niet, stappende, bereikte ik Paoeni. Terstond begon, na de eerste begroeting, het kerkgezang, en door allen vergezeld begaf ik mij naar het negorijhuis, dat tevens diende voor woning van den godsdienstonderwijzer. Het was eene ruime met atap gedekte bamboewoning met eene breede voorgalerij, waar de schoolkinderen zich rondom schaarden. Eene kleine ronde tafel met een bontgekleurd kleedje stond midden in, benevens een stoel waarop ik plaats kon nemen. Omdat ik niet lang in elke gemeente vertoeven kon, deed ik terstond onderzoek naar de werkzaamheden, en besloot hier een dag langer te blijven, daar 23 Alifoeren uit de naburige negorij Herlan zich bij den godsdienstonderwijzer hadden aangemeld om gedoopt te worden. Daar de hulpprediker van Lokki, in wiens afdeeling Paoeni ligt, aldaar kort te voren ook 21 Alifoeren gedoopt had en de orang kaja, het hoofd der negorij, ook daaronder begrepen was, kon en mocht ik aannemen, dat de geheele negorij tot het Christendom zou overgaan en het oogenblik gunstig was om in Herlan eene nieuwe inlandsche Christengemeente te vormen. Intusschen zongen de kinderen allerlei liederen, tot mijne groote verbazing zelfs het "Wien Neerlandsch bloed" en "Piet Hein" in 't Maleisch, eene groote bijzonderheid in eene Alifoersche Christengemeente, daar ik bij gelegenheid, toen ik als lid der schoolcommissie voor 't inlandsch onderwijs in Ambon, aan 't slot eener openbare les den adjunct-inspecteur vroeg, of de kinderen ook het "Wien Neerlandsch bloed" konden zingen, ten antwoord kreeg, dat zij dit vaderlandsch lied niet kenden. En hier was maar een godsdienstonderwijzer, een man uit het volk, die geen kweekschool voor inlandsch onderwijs had bezocht en sedert een paar jaar die Alifoersche Christengemeente had onderwezen. Genoeg, die vaderlandsche liederen, vierstemmig gezongen, onder Alifoeren te hooren, voorgedragen door kinderen van ouders, die ruw en onbeschaafd vroeger vaak op roof en moord waren uitgegaan, was aangrijpend, en ik haastte mij dan ook de kinderen op koekjes te tracteeren, die ik meegenomen had als belooning voor hunne vorderingen, welke versnaperingen zij gretig aannamen. Zoo was het ook aardig te hooren, hoe de oudste kinderen verschillende verhalen uit de bijbelsche geschiedenis uitvoerig wisten medetedeelen, en dat hoofdzakelijk uit herinnering van hetgeen de godsdienstonderwijzer hun verteld had, daar zij den bijbel niet goed konden lezen. Ik kon dus, na een paar uur met de kinderen te zijn bezig geweest, over dat onderzoek zeer tevreden zijn. Het spreekt van zelf, dat de voorgalerij, waar ik mij met de kinderen onderhield, langzamerhand door inlanders dicht omgeven was; alleen de godsdienstonderwijzer en de beide orang kajas van Paoeni en Herlan waren in mijne onmiddellijke omgeving. Terwijl de onderwijzer erg zenuwachtig en bedrijvig was, zagen de inlandsche hoofden met nieuwsgierigheid toe, wat er gebeuren zou. De orang kaja Herlan had eene oude zwarte jas aan, waardoor hij zich in kleeding van de zwarte katoenen baadjes der andere Christenen onderscheidde. Hij was al een bejaard man, die schuw rondzag, maar af en toe in zijn oogopslag verraadde, dat hij tot alles in staat en niet afkeerig was van het overmatig gebruik van sagaweer. Ook de orang kaja van Paoeni, een flinkgebouwde kerel van middelbaren leeftijd, scheen me toe aan de sagaweer verslaafd te zijn, maar onderscheidde zich van zijn ambtgenoot, doordat hij een oud versleten baadje aan had, dat vroeger wit geweest was, terwijl ook zijn broek om verstelling vroeg en hare oorspronkelijke kleur geheel verloren had. De godsdienstonderwijzer vroeg dan ook beleefd een nieuw pakeian voor hem, hetwelk waarlijk niet overbodig was; maar toen ik hem een nieuw baadje gaf, kwam hij schoorvoetend nader en vroeg mij of ik ook niet eene zwarte jas voor hem had. Aan zulke kleedingstukken had ik helaas niet gedacht, en tot mijn leedwezen moest ik hem antwoorden, dat ik op 't oogenblik hem daaraan niet kon helpen. Doch mijn jongen, een oudgediende op ons kantoor te Ambon, die de predikanten op hunne dienstreizen gedurende vele jaren had vergezeld, wist uitkomst; hij had een oude zwarte jas in stilte mee genomen en vroeg mij of hij die aan den orang kaja geven mocht, waar ik niets tegen had. Met van vrengde stralende oogen trok hij terstond die oude jas over zijn vuile baadje aan en bedankte ons hartelijk. Met zulke zwarte jassen en hunne wandelstokken met zilveren knop, waarop het Nederlandsche wapen, van het gouvernement, als teekenen hunner waardigheid, zien de hoofden met zekeren trots op het volk neer.

Ik deelde vervolgens nog eenige boekjes aan de kinderen uit, voorzag den onderwijzer ruim van leermiddelen, en besloot na een kerklied die eerste samenkomst met een kort gebed, gelijk ik haar evenzoo daarmede geopend had. De vrouw des huizes was intusschen bezig in de ruime binnengalerij voor de rijsttafel te zorgen, waarvoor ik het allernoodzakelijkste had meegenomen, en op mijn verzoek zouden ook de beide orang kajas hieraan deelnemen. Doch voordat wij aan tafel zouden gaan liet ik aan de gemeente bekend maken, dat er om 5 uur godsdienstoefening zon zijn en stelde ik voor een kort bezoek aan het naburige Herlan te brengen, ongeveer 20 minuten van Paoenie gelegen, dat langs een goeden, lommerrijken weg in de richting van het strand te bereiken

was. Welk een vruchtbaar plekje, rijk aan de schoonste houtsoorten, en een bodem, dacht mij, voor iedere houtplanting geschikt! Het was wel wat al te warm om in het middagzonnetje die wandeling te maken; maar ik liep onder zoo'n dicht looverdak, dat de zonnestralen nauwlijks eene opening konden vinden om nieuwsgierig door te dringen. Kleine slangen schenen daar in menigte te zijn, want af en toe zag ik ze snel over den weg of tusschen de dorre bladeren in het bosch schuifelen. Zij werden door de inlanders, die mij vergezelden, voor niet gevaarlijk gehouden. Weldra had ik Herlan bereikt, een Alifoersche negorij, misschien 150 zielen tellende, en bestaande uit eenige verstrooide atappen woningen, driehoekig en een paar meter boven den grond op palen gebouwd. Langs een boomstam, waarin eenige treden waren gehakt, gingen de inlanders met een vluggen tred door eene nauwe opening in hunne woning, waar een onaangename lucht moest heerschen, daar er binnen geen ventilatie was en de rook tusschen de atappen een uitweg moest zoeken. Voeg hierbij, dat men door eene opening in den vloer alle vuilnis op den grond laat vallen, die daar langzaam moet verrotten; geen wonder, dat men daar, waar men zoo weinig voor de gezondheid doet of liever van de hygiëne weet, aan verschrikkelijke epidemieën bloot staat, zoodat het dan ook in die gevallen niet zelden gebeurt, dat de helft der bewoners eener negorij komt te sterven. Zoo was er enkele dagen te voren eene hevige pokkenepidemie in Karlutukara uitgebroken, waarom mij door den civiel gezagfiebber te Wahaay beleefd verzocht werd daarheen niet te gaan, doch liever den godsdienstonderwijzer naar Paoeni te ontbieden. Binnen een paar uur was deze bij mij en deelde mij den droevigen toestand te Karlutukara mede, daar meer dan de helft der bewoners aan de pokken leed en het al gebeurd was, dat men, bij het uitbreken der ziekte in eene woning, naar de bergen gevlucht was en den zieke of stervende aan zijn lot had overgelaten. Gelukkig had ik een paar flesschen opgeloste kinine medegekregen, die ik den onderwijzer dadelijk meegaf. Indien de ziekte later nog grooter uitbreiding heeft gekregen, zou het mij niet verwonderen, indien ik hoorde, dat men de negorij had verlaten, om elders aan het strand weder nieuwe woningen te bouwen en zich daar te vestigen. Intusschen vertoefde ik maar weinige oogenblikken in Herlan, waar de meeste inlanders zich schuw verwijderden, toen zij den blanken heer zagen, terwijl men mij alleen deed opmerken, dat op verzoek van den hulpprediker van Lokki, de doodshoofden uit de baleo, de volksvergaderplaats der Alisoeren, in zee waren geworpen. Mij werd met zekere zelfvoldoening de plaats gewezen, waar die zegeteekens hunner menschenjacht gelegen hadden. Nu zij Christenen waren geworden, beloofden zij voortaan zulk een menschonteerend bedrijf te zullen laten varen. In Paoeni teruggekomen, was de rijsttafel gereed, die ik alle eer aandeed. Maar de gasten die ik erbij genoodigd had, waren niet op hun gemak. Op een bank te zitten en niet met hun vingers te eten, dat waren zij niet gewoon.

Het was nu hoog tijd dat ik wat ging rusten, en in mijn slaapkamer vond ik tot mijn verwondering een ledikant en verdere benoodigdheden voor mijn toilet. Om 5 uur was ik echter weder op de been en hield kerk in eene kleine woning, die voor school en kerk dienst deed, on daarna weder in de woning van den onderwijzer een begin te maken met het opmaken eener lijst van hen, die aanspraak hadden op het ontvangen van kleedingstukken. Vele nieuwsgierigen waren vrijmoedig in de binnengalerij gekomen om naar den inhoud mijner kisten te zien en het nieuwe goed te bewonderen, vooral de kammen en spiegeltjes, waarop de Alisoeren verzot zijn. De godsdienstonderwijzer raadde mij echter sterk af de kralen uit te deelen, daar dit aanleiding zou kunnen geven, dat de berg-Alisoeren, op halssieraden belust, zouden afkomen en sneljachten onder de christen-Alisoeren houden, waarvan hij mij akelige verhalen deed, zoodat ik bij het schijnsel van eene lamp, waarvan helaas het glas sprong, nu en dan met zekere vrees de binnenkomenden opnam. Bovendien, dat onverwacht opduiken van die mannen uit de zwarte duisternis, als zij stillekens binnenslopen, had iets spookachtigs en toen de orang kaja, die veel sagaweer gebruikt had, met alle kenteekenen van dronkenschap, half kruipende plotseling achter ons stond, den onderwijzer streelende en aaiende, kwam het mij zoo voor, dat die kerel met zijn gemeene rooverstronie weinig te vertrouwen was en op het zien van al dat moois wel eens belust kon raken, om eerst onze hoofden en dan het andere te rooven. De onderwijzer wist hem echter met een zoet lijntje te verwijderen, maar bij die volslagen duisternis kon men niet weten of hij zich ver of in 't geheel niet verwijderd had. Wij pakten dan ook spoedig de afgemeten kleedingstukken weer in de kisten, terwijl twee jongens er de wacht bij zouden houden; want het huis stond aan alle zijden open en mijn slaapkamer genoot alleen het voorrecht van een atappen deur, die echter niet gesloten kon worden. Bij dat walmend lamplicht was het niet uit te houden en na ons eenvoudig avondmaal gingen wij spoedig naar bed. Het was mij echter onmogelijk de slaap te vatten en hoe langer ik wakker bleef, hoe meer mijn zenuwgestel overprikkeld en

vatbaar werd, om aan het minste gerucht eene verkeerde uitlegging te geven. Uit voorzorg had ik een dolkmes in bed medegenomen en het bezit van dit wapen deed reeds denken aan de mogelijke slachtoffers, die ermede konden worden getroffen. Als die dronken orang kaja nu op handen en voeten kruipende weder eens terugkeerde en de ontstelde bedienden, uit den slaap wakker geschrikt, plotseling aanviel, wat zou ik dan doen? Reeds ontwaarde ik in mijne verbeelding zijne magere gestalte, als een slang langs den grond naar de kisten kruipen, reeds zag ik hoe hij met zijne koolzwarte bliksemende oogen gretig een blik op de kisten wierp en uit zijn tjidako een padang of klewang voor den dag haalde, om den eerste, die wakker mocht worden, doodelijk te treffen. Doch wat was dat krabben en schuiven in mijn nabijheid? Waakte of droomde ik, was 't werkelijkheid of verbeelding? Met ingehouden adem bleef ik luisteren, rondtastende naar mijn dolkmes. Gelukkig zou ik met dit wapen toch altijd iets kunnen doen, en meer gerust trachtte ik den slaap weder te vatten. Opnieuw hoorde ik datzelfde geritsel, en nu was ik er zóó zeker van, dat er onraad was, dat ik overeind ging zitten, met mijn mes gewapend, en de dwaasheid had te roepen: Spada? Wie is daar? Men had het licht in de binnengalerij laten branden, zoodat ik door een kier van mijne deur kon zien, wat daar plaats mocht hebben. Maar daarvoor was 't mijns inziens nog te vroeg, en het geschuifel had ik niet dáár, maar in mijne nabijheid gehoord. Op mijn roepen werd ik echter den brutalen indringer gewaar, twee gloeiende oogen ontmoetten de mijne en opgestaan had ik hem wel mijn mes in het hart willen steken, maar gaf dien gladakker van een hond, die mij zoo mijne nachtrust had bedorven, een trap, dat hij jankende wegstoof. Mijne bedienden waren rustig blijven slapen, en door een kier van mijn deur bespeurde ik hoegenaamd niets, dat mij met onrust vervulde, zoodat ik weder stil naar bed ging en spoedig in slaap viel.

Toen het dag geworden was, haastte ik mij weder te beginnen met wat ik den vorigen avond niet had kunnen afdoen, en om 8 uur stond ik in het stampvolle kerkje weder te preeken en doopte eenige mannen, vrouwen en kinderen die zich daartoe aangemeld hadden. Het was eene eigenaardige plechtigheid die Alifoeren schamel gekleed, te zien nederknielen, hoofd voor hoofd, geholpen door den godsdienstonderwijzer, om den doop te ontvangen. Van mijn toespraak konden zij ongetwijfeld niets verstaan, daar zij eene andere taal spreken, maar blijkbaar waren zij toch onder den indruk van hetgeen plaats vond, want ernstig en stil zaten zij mij nauwlettend aan te staren. Nauwlijks was de gods-

dienstoesening asgeloopen, of daar belegerden zij als 't ware mijne woning, nieuwsgierig naar hetgeen ik nu zou doen en wat ieder krijgen zou. Nu had ik gelukkig voor een ruimen voorraad gezorgd, en toen de lijst der namen werd asgelezen, ieder op zijn beurt zijn aandeel kreeg en dankbaar aannam, gingen allen opgetogen heen, zoodat ik er zeker van ben, dat deze dag langen tijd, ja, jaren lang bij hen in herinnering blijven en ook goede vruchten dragen zal, om de zending in deze streken verder uit te breiden en den Islam tegen te houden. Vermoeid ging ik na de rijsttasel wat rusten en vertrok om vier uur naar Latea.

Het was heerlijk weder en daarbij lichte maan, zoodat ik mij voorstelde eene aangename reis te zullen maken. Ik nam weder in mijn luierstoel op het paviljoen van mijn orembaai plaats en genoot langs de kust, nu roeiende dan zeilende, onder het lawaai van tifa's en gong, een heerlijk uitzicht op de steile rotswanden, bergen en bosschen van Ceram. Verscholen onder het loover der boomen, zagen wij de door de pokziekte zoo zwaar bezochte negorij Karlutukara en verderop de negorij Paa, waar de zending tot nog toe vergeefs gepoogd heeft het Christendom uit te breiden. Met het vallen van den avond vlogen zwermen bontgekleurde vogels over naar de toedjoeh paeloe of zeven eilanden, die wij langzaam naderden, welke eilanden, onbewoond, nochtans op een afstand een rijken plantengroei toonden te bezitten en aan vogels een veilige schuilplaats aanbieden. Daar het bladstil geworden was, bleven wij zeer kort onder de kust varen; maar nu de vogels begonnen te zwijgen werd alles doodstil en nergens was eenig spoor van de aanwezigheid van menschen of dieren. Alleen het zeer rijke vischwater gaf nu en dan eenige afwisseling en levendigheid, als onverwacht niet één maar soms zelfs honderd en meer visschen hoog boven het water opsprongen, blijkbaar om hun vervolger te verschalken of te ontvluchten. Eens had dit zelfs zoo dicht in onze nabijheid plaats, dat de roeiers de vliegende visschen met de hand trachten te vangen, terwijk wij in het woelige water duidelijk de snelle vaart van hun vijand konden bespeuren. Het zou misschien de moeite geloond hebben, indies de roerganger zijn vischtuig had uitgeworpen, hetwelk hij later op or zen terugtocht deed maar zonder succes; ik zou ongetwijfeld getuige geweest zijn, hoe men met een flinken koperen haak, voorzien van een stuk visch en versierd met witte kippenvederen, aan eene lange stevige lijn een kolossaal dier kan vangen.

Weldra kwamen wij aan kaap Lisabatta, en lieten de zeven eilander rechts van ons. Onze stuurman, die mij eerst verteld had, dat wij den

volgenden morgen Latea zouden bereiken, verblijdde mij nu met de verwachting, dat wij, met zoo'n gunstige vaart, door den stroom geholpen, misschien wel tegen twaalf uur aan de plaats onzer bestemming zouden zijn. De roeiers pagaaiden met alle kracht en als een giek doorsneden wij het water, waarbij de tifa's en de gong het niet weinig ontgelden moesten. Plotseling hoorden wij menschen aan het strand roepen en vragen, en toen wij hun eenige malen toeschreeuwden, dat de pandita besar van Ambon aan boord was en naar Latea ging en zij ons toeriepen bewoners van Latea te zijn, gaven wij hun de boodschap mede, mijne komst aan den godsdienstonderwijzer te berichten. Doch in Latea aangekomen, heb ik te vergeefs naar die menschen gevraagd, zoodat ik vermoed, dat het Alisoeren waren, die ons niet hebben verstaan. Intusschen kwam de voorspelling van den stuurman uit en lagen wij om half twaalf reeds voor Latea ten anker. Ofschoon de onderwijzer nog aan boord kwam en mij uitnoodigde aan den wal te komen, bleef ik dien nacht liever in mijn paviljoen schommelen, daar ik wel wist, dat ik den man in groote verlegenheid zou brengen, indien ik zijn aanzoek aannam. Reeds was mij medegedeeld, dat de negorij Latea, vroeger een paar uur verder gelegen, door de bewoners wegens de pokkenepidemie, waardoor de helft van de negorij was uitgestorven, in brand gestoken en verlaten was, en dat men met den onderwijzer aan het hoofd eene nieuwe plaats aan het strand uitgekozen had, zoodat ik nu een bezoek zou brengen aan het nieuwe Latea, dat nog in aanbouw was. Wat al ellende, dacht ik, moeten die menschen niet hebben doorgestaan, om in vertwijfeling hunne woningen in brand te steken en een nieuwe woonstede te zoeken! Welke akelige tooneelen moeten er niet hebben plaats gehad bij de uitbreiding dier vreeselijke ziekte! De onderwijzer verzekerde mij, dat hij dag noch nacht rust gehad had om de zieken te bezoeken, de stervenden te troosten, de dooden te begraven en de gezonden te dwingen niet in het gebergte te vluchten, en zieken en stervenden, oude mannen, vrouwen en kinderen aan hun lot over te laten. Ten einde raad had hij de wanhopige bevolking voorgesteld met kalm overleg en gezamentlijk die besmette negorij te verlaten. Zonder daartoe eerst de toestemming te vragen van den civielgezaghebber te Wahaay, die dat verzoek wederkeerig aan den resident van Ambon moest doen, waardoor maanden verloren gingen, was hij langzamerhand met den orang kaja en het overschot naar deze plaats vertrokken, waar men nu nog druk bezig was boomen te kappen en nieuwe atapwoningen op te richten. Met nieuwsgierigheid en belangstelling bezocht ik

den volgenden dag 's morgens vroeg het nieuwe Latea, en werkelijk stond ik verbaasd, met hoeveel overleg, ook met het oog op de hygiene, die onderwijzer de bouworde hunner nieuwe woningen geregeld had. Op ongeveer 200 meter van het strand had hij, met een breeden weg tusschen beiden, twee rijen woningen laten oprichten, die met eene groote ruimte van elkaar maar toch in dezelfde richting gebouwd waren, en die niet in een driehoekigen vorm opgetrokken op palen stonden, maar vierkant en vlak op den grond. Zulke vergaarbakken van allerlei smetstoffen konden dus niet meer onder de woningen gevonden worden; na zoo'n dure les gekregen te hebben om voor de gezondheid beter zorg te dragen, bracht ieder alle vuilnis in zee of verbrandde die in het bosch

Het aantal zielen dezer negorij bedroeg slechts zestig. Het is gelukkig voor den inlander, dat hij zich met zeer weinig weet te behelpen, slechts leeft van hetgeen de natuur hem geeft aan vruchten, hier hoofdzakelijk sago en visch, en voor zijne kleeding bijna niets en voor woning slechts datgene noodig heeft, wat hij in overvloed in de bosschen kan vinden, namelijk bamboe en atap. Geen wonder dat de rijke natuur en het warme klimaat hem traag maken, daar hij geen behoeften kent of als hij die heeft ze onmiddellijk kan bevredigen. Voor hem bestaat evenmin een prikkel tot ingespannen arbeid om het land te ontginnen of tuinen aan te leggen, als voor den rijken Europeaan, die de middelen bezit om op elk oogenblik zijne billijke wenschen en behoeften en meer nog dan dat bevredigd te zien. Zoolang dan ook de bevolking op Ceram zoo gering blijft, geen vreemdelingen den rijken bodem gaan ontginnen en het volk dwingen mede te arbeiden of het geheel verdringen, is het niet te verwachten dat er ooit eenig belangrijk handelsverkeer met Ceram zal plaats hebben. De inlander kent geen andere weelde dan rust; in zijn oog is werken straf, slavernij, en daarvan heeft hij den grootsten afkeer. Daarom kan de man het uren lang op zijn hurken rustig aanzien, als de vrouw voor het eten en het huishouden zorgt, want hij zou 't beneden zijne waardigheid achten iets meer te doen dan hetgeen hoogst noodzakelijk is. Het valt echter niet te ontkennen, dat het Christendom ook in dit opzicht een allergezegendsten invloed uitoefent, want het onderscheid is verbazend groot, als men een Mahomedaanschen kampong of een Alifoersche negorij en een Inlandsche Christen-negorij binnenkomt. In de Mahomedaansche of Islamsche kampongs zien woningen, wegen en menschen er allervuilst uit, zoodat men er zich ova verwonderen moet, hoe menschen in zulk eene ongezonde en stinkende omgeving kunnen leven en zich bewegen; in de Christen-negorijen zijn

woningen en wegen veel zindelijker en de bewoners netjes gekleed, ofschoon ik juist niet kan zeggen dat ik die zwarte kabaaien voor inlanders mooi vind. Zoo merkte ik ook in Latea op, dat de mannen vischnetten knoopen konden en prauwtjes uit boomstammen vervaardigd hadden, om daarmede op de vischvangst te gaan. Ook had de onderwijzer, op de meest primitieve wijze, een paar welputten van meer dan 8 meter diep in het zand weten te graven, opdat er goed drinkwater zou zijn; want de menschen zijn er van vele materialen verstoken en moeten door eigen vindingrijkheid trachten te vergoeden, wat hun door hunne afgezonderde ligging, ver van alle communicatie met grootere negorijen, is onthouden. Geneeskundige hulp ontberen zij geheel en al, doch in den regel behelpen zij zich veel liever met inlandsche kruiden, waarvan de geneeskracht hun bij eigen ervaring gebleken is, dan dat zij bij onze doktoren hulp zullen vragen. Inzonderheid voor de vaccine schijnen zij zeer bang te zijn, behalve in die negorijen, waar men reeds jaren lang den zegen der vaccine ondervonden heeft.

Het spreekt van zelf dat ik, na alles wat ik van de geschiedenis van het oude en nieuwe Latea gehoord en gezien had, den onderwijzer, die door zijn standvastig optreden een Christen-negorij van zijn ondergang had bevrijd en door zijn voorbeeld nieuw leven gewekt had, een woord van welverdienden lof toesprak. Zijne vrouw en eenige dochter waren met den orang kaja voor eenige dagen op reis gegaan naar Amakei, aan de Zuidkust van Ceram gelegen, een afstand van drie dagen te voet, over bergen en door dichtbegroeide wouden, een reisje dus, hetwelk wij Europeanen niet zouden durven of kunnen ondernemen, met al de ontberingen en vermoeienissen, die er aan verbonden zijn. Mijn jongen zorgde dus voor de tafel, terwijl ik 's morgens mijn dienstwerk verrichtte door godsdienstoefening te houden en het huwelijk van een viertal paren in te zegenen. Het kost anders moeite om de inlandsche Christenen tot eene huwelijksinzegening te bewegen, want zij weten dat zij door die plechtigheid, volgens gouvernementsbesluit, wettig verbonden en, zooals wij 't noemen, getrouwd zijn, en dat eene wettige scheiding lang niet zoo gemakkelijk gaat. Meestal verhiezen zij dan ook het zoogenaamde huwelijk volgens de adat van het land, hetwelk slechts hierin bestaat, dat de man eene keuze doet uit de dochteren des lands, dat meisje schaakt, daarop zekere huwelijksgeschenken aanbiedt of laat nederleggen voor de woning der ouders van het meisje, en nadat die aangenomen zijn rnet haar blijft leven zonder ooit zijne vrouw te verlaten. De kinderen uit zoo'n huwelijk zijn in hun oog even wettig als die uit een huwelijk

volgens gouvernementsbesluit. Zelfs in Ambon is het aantal onwettige kinderen daardoor zeer groot en men beschouwt het wettig huwelijk ook hier als eene zaak van weelde, dat alleen zij kunnen sluiten, de partijen kunnen geven en het huren van een trouwpak betalen; want men zou niet zeggen, dat men hier voor het huren van een bruidstoilet van rose zijde, rijk met zilver- en gouddraad geborduurd, en de rijk versierde bruidskrans vijfentwintig gulden vraagt. De bruidegom met zijn verkleurden zwarten pantalon en dito rok, die hem meestal te wijd of te nauw, te lang of te kort zijn, en zijn zwarten cilinderhoed, die door zijn verschoten kleur en zijne bedenkelijke rimpels een hoogen leeftijd en veelvuldig gebruik verraadt en hem bovendien ook meestal niet past, komt er altijd goedkooper af. Intusschen was ik met die huwelijksinzegening in Latea niet gelukkig. Ook een vijfde huwelijkspaar, na volgens we: en regel op twee achtereenvolgende Zondagen na de godsdienstoefening te zijn afgekondigd, zou wettig in den echt verbonden zijn geworden, indien niet op het laatste oogenblik, toen ik bruid en bruidegom verzocht elkander de rechterhand te geven, deze bruidegom de gevraagde handeling volstrekt bleef weigeren, ofschoon de onderwijzer alle moeite deed hem aan het verstand te brengen, dat hij evenals de andere bruide goms moest doen, en nu eens de bruid dan weder den bruidegom bij den arm nam, om ze tot elkander te brengen. Het kostte moeite bij deze zonderlinge stoornis ernstig te blijven; doch de kleine gemeente scheen er zich niets over te verwonderen of begreep van die zaak weinig of niets. Natuurlijk ging het huwelijk van dat paar niet door, en als reden van zijne weigering deelde hij mede, dat die vrouw hem niet beviel en dat hij met haar niet kon en niet wilde trouwen. Met eene ernstige bestraffing en vermaning aan het adres van den bruidegom, door den opderwijzer in de volkstaal vertolkt, waarbij de bruid erg snikte, liep deze plechtigheid af. De kinderen zongen ook hier alleraardigst geeste lijke en andere liederen en gaven blijken goed onderwijs in de bijbelsche geschiedenis te ontvangen, ofschoon slechts een enkele wat kon lezen. Wat ik nog over had aan leermiddelen en kleedingstukken gri ik den onderwijzer ter uitdeeling; maar het speet mij voor den ijverigen en beleidvollen man, niet wat meer gespaard te hebben, omdat zijzt gemeente daardoor den indruk zou hebben ontvangen, dat ook wij zijn werk en zijne leiding waardeerden. Ik beloofde aan hem en de gemeent stellig, zoodra daartoe een gunstige gelegenheid bestond, een kist me kleedingstukken en levensmiddelen te zullen zenden.

Ik hoopte, als ik 's middags bijtijds weder vertrok, den volgendes

morgen in Sawaay te kunnen komen, om dan nog op dienzelfden dag naar Wahaay door te roeien; doch dit kwam gansch anders uit. Wel vertrokken wij om drie uur, maar er was veel wind, die langzamerhand al meer en meer opstak, zoodat wij eindelijk met al die roeiers bijna niet meer vooruit kwamen. Daarenboven werd de branding tegen het strand steeds heviger, zoodat de stuurman besloot, na de orembaai een uur ver door de roeiers, die als ratten naar den wal waren gezwommen, aan een lang touw te hebben laten voortslepen, op eene vrij stille plaats voor anker te gaan liggen om den avond af te wachten. Doch de stuurman keek evenals ik met een zuur gezicht naar de witgevlokte golven, die onrustig door den sterken wind naar het land werden opgejaagd. Nog een oogenblik zouden wij wachten, en "ja, het zou nu wel gaan," zeide hij mij in zijn taal, "want anders zou mijnheer morgen niet thuis wezen, ofschoon dit nu al bezwaarlijk lukken zou." Met frisschen moed en uit alle kracht begonnen de roeiers te pagaaien, en al schommelend en wiegelend bleef ik boven in mijn luierstoel. Doch toen wij een uur ver waren, zagen wij een viertal groote prauwen voor anker, ongeveer een half uur voor kaap Lisabatta. Had de stuurman toen gevraagd, waarom zij daar waren blijven liggen, en mij voorgesteld den nacht daar ook door te brengen, in afwachting tot het stil weder zou worden, dan hadden wij niet zooveel levensgevaar geloopen, als nu het geval was. Want al verder en verder met moeite voortroeiende, kwamen er zulke hooge golven aanrollen, dat ik nauwelijks mijn evenwicht kon bewaren en, werden wij door een golf opgenomen, zoodat men als in een afgrond zag. Vloog het water over de plecht, dan konden de roeiers op de vlerken zich ternauwernood vastklemmen en kwamen zij tot aan de borst in het water. Toen het gevaar al grooter en grooter werd en het gevaarlijkste punt, de kaap zelf, waar eene hevige branding stond, nog lang niet was bereikt, riep ik den stuurman toe, dat wij niet verder moesten gaan, maar naar de ligplaats der andere prauwen terugkeeren. Ook hij zag het gevaar in, maar het vereischte vrij wat zeemanschap en voorzichtigheid om terug te keeren, zonder in de branding om te slaan; doch toen ook dit gevaar te boven was gekomen waren wij, door wind en golven voortgestuwd, in korten tijd bij de ligplaats der andere prauwen voor anker, waar wij hoorden, dat ook zij wegens de hevige branding daar waren gaan liggen. Spoedig ging ik in mijn paviljoen, nam een cognacgrog, wikkelde mij in mijn plaid en sliep gelukkig spoedig in, totdat ik onverwacht gewekt werd door het rumoer der roeiers, die aanstalten maakten om de reis te vervolgen. Het kwam mij wel wat vroeg voor, doch de stuurman verzekerde mij dat het bladstil was geworden en de andere prauwen ook reeds waren vertrokken. En werkelijk waren wind en golven gaan liggen, maar er was geen sprake van dien dag in Wahaay te zullen komen, daar wij met alle inspanning eerst om 1 uur Sawaay bereikten. Ik had anders van dat varen in zoo'n geriefelijke, groote, ruime orembaai met 24 roeiers, mast, zeilen en muzikanten op den koop toe, vrijwel mijn bekomst en verlangde hartelijk naar den vasten wal.

Door mijn jongen liet ik te Sawaay vragen, of ik bij de radja rijst mocht koken en daar komen eten. Daar de radja afwezig was, kreeg ik van zijne vrouw bericht, dat haar dit een groote eer zou zijn. Ik aarzelde dan ook niet lang van die eer gebruik te maken, en aan wal gezet met een kleine vlerkprauw, spoedde ik mij naar het huis van den radja, waar reeds verscheidene inlanders, de aristocratie van Sawaai, mijn komst nieuwsgierig afwachtten. Het waren echter alle vuilgekleedde Mahomedanen, en de vrouw van den radja, met een scheel oog en een hazenlip, zag er allerminst bekoorlijk uit. Als die andere vijf vrouwen van dien Sawaayschen koning, in verschillende kampongs woonachtig, er niet beter uitzien, dan heeft die man eene slechte keuze. Aan beleefdheid en vriendelijke ontvangst ontbrak het niet, ofschoon ik wel wat huiverig was die vuile kerels een hand te geven; ik deed het dan ook maar bij een enkele. In dat paleis waren maar twee stoelen, die van de binnengalerij naar de voorgalerij en dan weder van de voorgalerij naar de binnengalerij mij werden achterna gedragen. Eigenlijk was er nog een stoel te veel voor het gezelschap, want zij gingen op de hurken zitten en verlieten mij spoedig, terwijl de vrouw van den radja zich in haar boudoir terugtrok, een smerig kamertje, te vuil om te beschrijven, met allerlei kenteekenen van overvloedig gebruik van de sirihpruim, waarvan ik later, toen ik een frisch bad in een bergstroom achter Sawaay genomen had, mocht gebruik maken om mij te verkleeden. In Sawaay, op een klein plekje tegen steile rotswanden gelegen, was niets bijzonders te zien; woningen, wegen en menschen zagen er allersmerigst uit, en dat nog wel op Vrijdag, den heiligen Zondag der Mahomedanen. Alleen had ik het voorrecht hier een paar berg-Alifoeren te zien en te spreken te krijgen, door tusschenkomst van een tolk. Beide waren sterkgebouwde, jonge kerels, die niets anders aan hadden dan hun tjidako, doch een hunner had een bijzonder kapsel, daar hij zijn hoofd in het midden kaal had geschoren en op het voor- en achterhoofd groote pruiken haar droeg. Beiden droegen kralen

halssnoeren, doch toen ik deze van hen wilde koopen voor geld of fraaier kralen, gaf een hunner tot antwoord: "eer mijn kop af, dan dat ik van die kralen afstand doe." Zij woonden boven op die steile rotsgevaarten, waar klapperboomen stonden, en kwamen nu en dan met vruchten of vogels naar beneden om ruilhandel te drijven. Behalve een jongen kakatoe, dien ik op Paoeni had kunnen koopen, had ik niets bijzonders kunnen medenemen van deze reis. Ik was echter blijde, toen wij om 6 uur Sawaay weder verlieten en den volgenden morgen te Wahaay aankwamen, waar ik hartelijk werd verwelkomd en mevrouw Boot voor hare goede zorgen, vooral voor het drinkwater, nogmaals bedankte, verzekerende dat ik eene goede reis had gehad en de orembaai uitstekend had voldaan, maar toch eene reis over land zou verkiezen, indien deze zoo te maken was. Ik ging mij dadelijk in huis verkwikken, nam een heerlijk bad en vernam aan de gezellige ontbijttafel van den president van den landraad, dat het proces met dien moordenaar was afgeloopen en de doodstraf over hem was uitgesproken, hetwelk hij met een "baik, toewan", het is goed, mijnheer, kalm had beantwoord. Dat die man aan het leven zoo veel niet meer hechten kon, verwonderde mij niets. Hij was afgeleefd, en het leven in eene gevangenis, waar hij, meen ik, een paar uur per dag de vrije lucht mocht in ademen, hoewel onder bewaking van een paar soldaten, daar hij, de zoon der wildernis, het al eens gewaagd had zijn kerker te ontvluchten, was hem zeker slecht bevallen. Nu waren er nog een paar kleine zaken door den landraad af te doen, maar men zou er den Zondag-morgen weer voor besteden, om Maandag-morgen naar Ambon terug te keeren. Ik kon dus 's avonds mijn voornemen ten uitvoer brengen en liet aan de Maleische gemeente bekend maken, dat er Maleische dienst zou zijn en avondmaal gehouden worden.

Aan die plechtigheid werd door alle leden der gemeente trouw deel genomen en het kerkgezang ging nu uitstekend. Voor allen, die naar zoo'n kerkgang reeds zoo lang hadden verlangd, was dit avonduur een stichtelijk uur geweest. Ik was dus niet te vergeefs naar die afdeeling van Ceram gegaan, en als eerlang en op Wahaay en op Herlan twee godsdienstonderwijzers werkzaam zijn, zal men de vruchten van dit bezoek kunnen aanschouwen. De laatste avond van ons verblijf op Wahaay was zeer gezellig en aan de hartelijke ontvangst van de familie Boot zal ik steeds met innig genoegen blijven gedenken. Nog dienzelfden Zondagmorgen vóór 9 uur noodigde de heer Boot ons uit eene wandeling naar het jachtterrein te maken, nam zijn oppassers en zes jachthonden mede,

en wij konden ons overtuigen, hoe bij een langdurig verblijf de jacht eene gewenschte en aangename afleiding aanbiedt. Daar wij niet ver van huis mochten gaan, al waren wij ook reeds om zes uur op marsch, en wij al vragende en pratende langs een smal bergpad door het dichte woud gingen, was het niet te verwonderen dat wij op de ruime grasvlakte, omzoomd door dichte bosschen, geen herten of wilde zwijnen te zien kregen; daarentegen genoten wij een heerlijk uitzicht op Wahaay en naar zee, en verkwikten ons in de frissche morgenlucht. Al verder over die grasvlakte het bosch weder ingaande, bewonderden wij de ontelbare lianen onder anderen de tali ajer, die, doorgekapt, frisch en drinkbaar water geeft, misschien op een meter lengte wel een half kopje vocht, een genot voor den inlander, als hij verre tochten door de bosschen moet maken. Tusschen de hooge wortels van een ouden kanariboom, konden wij ons gemakkelijk nederzetten om van de kippenpastei te genieten, die onze vriendelijke gastvrouw de jongens had meegegeven, en hoogst voldaan kwamen wij van die laatste morgenwandeling te huis.

Ik vond het echter gelukkig voor den heer Boot, dat hij ten gevolge van zijn dubbelen werkkring ook dubbel werk had, waardoor hij de eenzaamheid vergat en de tijd hem omvloog. Met den grootsten ijver bekleedde hij zijn ambt, terwijl hij het verblijf voor militairen en burgers had zoeken aangenaam te maken door het oprichten van een kegelbaan, die juist den 2^{den} Aug. was ingewijd en waarvan ruim gebruik gemaakt werd. Met een hartelijk vaarwel, tot wederziens, namen wij Maandags 's morgens afscheid van Wahaay en zijne bewoners, en kwamen, na eene zeer voorspoedige reis, den 22^{sten} Aug. 's morgens te Ambon aan.

Amboina, October 1888.

Berichten betreffende het wetenschappelijk onderzoek der Kei-eilanden en van het eiland Flores.

De volgende brieven zijn ontvangen van de heeren H. O. W. Planten en R. van den Broek, na degene welke op 492 vlg. van den loopenden jaargang van ons tijdschrift zijn gepubliceerd.

TOEAL, 31 Maart 1890.

Aan het Bestuur van het Kon. Nederl. Aardrijkskundig Genootschap.

Ten vervolge op mijn schrijven van December l.l. heb ik de eer u het volgende mede te deelen.

In genoemd schrijven heb ik vreeselijk geklaagd over het slechte weder dat we toen hadden. Dit heeft nog aangehouden tot het laatst van December, toen het begon af te buien, zoodat het nieuwe jaar met prachtig weder kon inzetten. Na het vertrek der mailboot begaf ik mij dadelijk naar de Oost-kust van Groot-Key, waar ik 2½ maand aan het werk ben geweest en waar ik ook gereed gekomen ben, doch niet zoo als ik wel gewenscht had.

De kustlijn is goed en nauwkeurig in kaart gebracht, doch aan looden heb ik niet veel kunnen doen.

Het terrein was daar niet geschikt om met een klein zeilvaartuig te werken. Het was ôf doodstil, ôf wanneer er wind was, was het te gevaarlijk door de hevige valwinden, die bij buiig weder met de kracht van een storm over de bergen vielen.

Om u een denkbeeld te geven hoe het op die kust in den Westmoeson kan spoken, haal ik hier eene beschrijving aan, die een Engelschman, Captain Strachan, in een boek getiteld "Explorations and adventures in New-Guinea" van zulke buien geeft.

"At three o'clock the officer of the watch called me to report that we were drawing near to the land. On reaching the deck I saw to the windward what appeared to be the outline of the great Ki-island. The ship was kept away to run down along the coast, then strangely the island seemed to alter its shape, and the ship was kept away a little more.

The island next appeared to be advancing towards us, and it suddenly struck me that it was one of those terrific hurricane squalls that sweep these seas, which, having come over the great Ki, was advancing towards us, presenting an outline something like that of the island.

Sail was immediately shortened, and shortly after the squall struck us with hurricane force. Rain fell in torrents, and the vivid flashing of the lightning, with now and again a sharp crack of thunder, as if the earth was rending in twain, made the experience not a pleasing one either to myself or to my ill-fed crew.

The oscillations of the compass too was something remarkable. During the height of the storm the compass seemed to oscillate at least 180 degrees, while the roaring of the wind-spouts passing within a few hundred yards of the ship, showed in how close proximity we were to destruction.

For over two hours and a half the squall raged with the violence of a terrific hurricane; then it passed over and was followed by numerous short squalls of less force."

Twee malen heb ik dan ook, gedurende ongeveer een half uur, in dergelijke buien met mijn scheepje plat op zijde gelegen, zoodat, indien niet alles dicht gesloten geweest was, we waarschijnlijk verongelukt waren.

Ik wil wel bekennen dat ik bang was voor een derde maal, zoodat ik dan ook het looden op eenigen afstand van de kust gestaakt heb.

Te eerder ging ik daartoe over omdat de kust geheel schoon is. Overal loodde ik al op 4 à 500 m. uit den wal, op 50 vaam geen grond.

Het was anders aan die kust aangenaam werken. Het land is mooi en de menschen zijn er zeer goedaardig, eenvoudig en behulpzaam. Van de hoofden had ik ook veel hulp. Verscheidene photografische af beeldingen, zoowel van land als volk, heb ik daar gemaakt.

Nu is mijn plan, na het vertrek der mailboot, naar de westkust van Klein-Key te gaan, waar ik hier en daar nog wat af te maken heb en dan naar Tajando te gaan. Ik reken dan in Mei gereed te zijn, zoodat mij nog eenige tijd overblijft voor het afmaken der kaarten enz. en hoop ik dan in Juli Key te verlaten.

De geheele Key-groep is dan opgenomen, behalve Koer, maar dat ligt ook zoo ver weg, dat het eigenlijk niet als tot deze groep behoorende, kan gerekend worden.

Van topografeeren zal niets meer komen, daar mijn fondsen langzamerhand uitgeput raken.

Veel wordt hierdoor niet verloren, want ik weet eigenlijk niet wat of te topograseeren is. Hier en daar ben ik het binnenland van Klein-Key in geweest, en vond niets als bosch, met hier en daar een tuin en een doolhof van slechte voetpaadjes. Nu eens is het terrein vlak dan eens heuvelachtig. Groot-Key te topograseeren, daaraan valt niet te denken,

daar het te veel onkosten zou veroorzaken, en bovendien het voornaamste heb ik toch verricht, daar alle bergen, zoowel hunne ligging als hoogten, bepaald zijn.

De meteorologische waarnemingen werden voortgezet. Deze zullen nu niet meer geregeld gedaan kunnen worden, daar ik genoodzaakt ben mijn waarnemer met deze mail, wegens ziekte, naar Ambon te evacueëren.

Van mijn opvatting, dat het hier een gezonde streek zou zijn, ben ik geheel teruggekomen. Al een jaar lang woeden overal hevige koortsen en, naar een globale berekening, is zeker t der bevolking daaraan bezweken.

Overal smeekten de menschen mij om geneesmiddelen, zoodat ik dan ook een kapitaal aan chinine uitgegeven heb.

Zelf heb ik er gelukkig niet veel hinder van, doch dat komt waarschijnlijk omdat ik altijd op het water leef.

Buy houdt zich ook steeds goed.

Ethnologische voorwerpen heb ik niet veel meer gekregen. Het land is hier ook niet rijk aan.

Met de meeste hoogachting

H. O. W. PLANTEN.

TOEAL, 3 Juli 1890.

Aan het Bestuur van het Kon. Nederl. Aardrijkskundig Genootschap.

Voor de laatste maal heb ik de eer, u van deze eilanden uit, een kort bericht toe te zenden.

Tot mijn groot genoegen kan ik u melden dat de opname gereed is. De geheele Key-groep is in kaart gebracht, uitgezonderd Koer, waarvan ik toch evenwel de ligging bepaald heb.

In deze laatste maanden ben ik werkzaam geweest op de Tajandogroep, waar ik veel last had van den harden oostewind, die dit jaar ook weer bijzonder vroeg doorgekomen is, en die mij ook belet heeft in de buurt van Key-Tenimber naar een aldaar aanwezig rif te zoeken.

Met het teekenen der kaart ben ik ook gereed, doch ik zal nog een tweede gereed maken, om deze, bij mijn komst te Batavia, aan de Regeering aan te bieden.

De meteorologische waarnemingen werden ditmaal niet zoo geregeld gedaan als vroeger, daar ik, bij mijn afwezigheid van Toeal, niemand had om de instrumenten af te lezen.

Verschillende photografische opnamen werden gedaan en ook nog enkele ethnografische voorwerpen verzameld.

Met deze mail vertrek ik nog niet, daar ik tegen de hooge onkosten opzie, maar ik ga in het begin der volgende maand met een van hier vertrekkende zeilgelegenheid op reis, dat heel wat goedkooper uitkomt.

Op Batavia zal ik nog eenigen tijd vertoeven, ten einde de instrumenten te vergelijken, om dan zoo spoedig mogelijk naar Holland terug te keeren.

Buy en ik genieten steeds de beste gezondheid.

Met de meeste hoogachting

H. O. W. PLANTEN.

Schrijven van den heer R. van den Broek.

BATAVIA, 5 Augustus 1890.

Aan het Bestuur van het Kon. Nederl. Aardrijkskundig Genootschap.

Uw schrijven dd. 30 April mocht ik in goeden staat ontvangen.

Het bleek mij, bij een bezoek aan Dr. Jonker te Makasser, dat ZWEZG. nog te zeer bezig was met de studie van de talen op Celebes, dan dat hij voor de kennismaking met het Soloreesch niet zou kunnen wachten, totdat mijne woordenlijst door het Genootschap gepubliceerd wordt.

Tot mijn spijt is het mij niet mogen gelukken nog op Flores mijn verslag en mijne kaart te voltooien. Tot den laatsten dag heb ik op beloofde inlichtingen moeten wachten, en ze zelfs nu nog niet gekregen.

Zoo spoedig mogelijk zal ik alles in gereedheid brengen en u doen toekomen.

Wat aangaat de gemaakte verzameling, ik zend u hiernevens een catalogus ervan. Een geheel eensluidend afschrift zend ik te gelijk aan Dr. L. Serrurier, met het cognossement van de twee kisten, die per stoomschip "Prinses Wilhelmina" direct aan het Museum, op 13 Aug. a. s., verzonden worden.

Wat aangaat de gemaakte photographieën, ik zal u een volledig stel afdrukken als drukwerk doen toekomen. Daar mij zelf de tijd ontbrak, heb ik die afdrukken bij een photograaf te Semarang doen maken. Het is na lang aarzelen, dat ik eindelijk besloten heb, in rijksdienst hier in Indie over te gaan. Had ik 2 jaren geleden dit besluit genomen ik zou, evenals de heer B....., nu reeds ingenieur 3de klasse geweest zijn, wat nu nog wel een paar jaren zal duren.

Wilt evenwel hierin geen uiting van spijt zien. Integendeel, al is het ook, dat het eigenlijke mij opgedragen werk niet het verwachte, of liever het gehoopte resultaat heeft gehad, ik meen genoeg gegevens op velerlei gebied verzameld te hebben, om met voldoening op mijn verblijf op Flores te mogen terugzien.

Vóór mijn vertrek naar Brebes geef ik de gebruikte instrumenten aan den overste Helb af, en zal een verklaring daarvan hier insluiten.

Na beleefde groeten aan de leden van het Bestuur, heb ik de eer te zijn, hoogachtend

.

Uw dienstvaardige dienaar,

R. VAN DEN BROEK.

Asp. Ingr. B. O. W. Brebes (Res. Tegal).

Mededeelingen van het Bestuur des Genootschaps-

Het Bestuur vestigt de aandacht der leden op eene uitnoodiging tot inteekening ten behoeve der oprichting van een gedenkteeken voor den Franschen onderzoekingsreiziger Camille Douls (zie de necrologie in dezen jaargang van ons tijdschrift), waartoe het plan is ontworpen door eene commissie, welke zich te Parijs heeft gevormd. Degenen die geneigd mochten zijn tot het geven van eene bijdrage kunnen de noodige inlichtingen betreffende de verzending van het geld, verkrijgen bij den secretaris; het schrijven, waarbij bovenbedoelde uitnoodiging gedaan wordt, is mede, op aanvrage aan den secretaris, ter inzage te verkrijgen.

Verder wordt hier overgenomen het volgende schrijven dat onlangs bij het Bestuur is ingekomen.

PADANG, Juni 1890.

Aan het Aardrijkskundig Genootschap te Amsterdam.

De Vereeniging voor Wetenschap Handel en Nijverheid alhier heeft de eer met de volgende mededeelingen en het na te noemen verzoek tot u te komen.

Reeds sedert geruimen tijd houdt onze vereeniging zich bezig met het doen van onderzoek naar de mogelijkheid van immigratie van Europeesche landbouwers naar de hoog gelegen vlakten van Sumatra. Zij is overtuigd dat aanvoer van nieuwe geschikte werkkrachten in deze landen, zeer wenschelijk, ja hoog noodig is, wil men verkrijgen dat deze landen in voorspoed en ontwikkeling vooruitgaan. Het behoeft voor ieder, die eenigermate met ons eiland bekend is, geen betoog dat in deze landen schatten bij schatten als 't ware verborgen zijn. Deze streken productief te maken is een dringende eisch des tijds.

Van daar dat ten vorigen jare door ons een Commissie benoemd werd ten einde naar de mogelijkheid van die immigratie onderzoek te doen. Een rapport werd dan ook uitgebracht, dat eenig licht verspreidde, echter niet voldoende was in vele andere opzichten. De historische zijde van het vraagstuk was onvoldoende behandeld en de zaak onvolledig uit een hygienisch oogpunt beschouwd.

Ten einde niet halverwege te blijven staan hebben wij daarna be-

sloten een *prijsvraag* uit te schrijven, welker formuleering in de bijlagen van dit schrijven wordt medegedeeld, en eene belooning uitgeloofd van f 500 (vijfhonderd gulden).

Op ons verzoek heest de Nederlandsch-Indische Maatschappij voor Landbouw en Nijverheid zich bereid verklaard deze zaak te steunen.

Alles wat overigens ter zake meer meldenswaard is, is in de bijlagen van dit schrijven te vinden.

Wij hebben thans de eer u het beleefde verzoek te doen, het slagen dezer onderneming wel te willen steunen door aankondiging dezer prijsvraag, zoo mogelijk ook door 't zij geheele, 't zij gedeeltelijke opneming der hierbij gezonden stukken in uw orgaan.

Ons voor de inwilliging van dat verzoek en zoo mogelijk voor toezending dier exemplaren van uw orgaan, waarin onze prijsvraag zal zijn aangekondigd, aanbevelende, heb ik de eer hoogachtend te zijn.

Uw Dienstw. Dr. Mr. J. H. CARPENTIER ALTING.

Adres (ook voor de antwoorden op de prijsvraag) Mr. J. H. Carpentier Alting, advocaat en procureur bij den Raad van Justitie te Padang, Secretaris der Vereeniging voor Wetenschap Handel en Nijverheid.

PRIJSVRAAG.

De Vereeniging voor W. H. en N. te Padang verlangt een geschrift, waarin:

ten eerste: de kwestie der immigratie van Europeesche gezinnen in de hooger gelegen streken der tropische gewesten, uit een historisch, hygienisch en economisch oogpunt wordt behandeld, en de oorzaken worden aangegeven, waaraan het al of niet gelukken van dergelijke immigraties moet worden toegeschreven;

ten tweede: op grond der medegedeelde seiten wordt aangetoond;

- a. welke verwachtingen mogen worden gekoesterd van pogingen, om de emigratie, voornamelijk van landbouwers en veehouders, uit Nederland te leiden naar de bovenlanden van Sumatra.
- b. welke voorwaarden daarbij moeten worden gesteld, om de kans van welslagen zoo groot mogelijk te doen zijn.

Voor het beste en tevens op zich zelf voldoende geachte antwoord wordt uitgeloofd een prijs van vijfhonderd gulden.

Bepalingen betreffende de inzending en de bekroning.

- t°. De antwoorden moeten, om ter mededinging naar den prijs te worden toegelaten, zijn geschreven op halfblad, met een duidelijk leesbare hand, en gesteld in de Nederlandsche, Fransche, Duitsche of Engelsche taal.
- 2°. Beknoptheid, waar zij niet te kort doet aan den eisch van het onderwerp, strekt tot aanbeveling.
- 3°. De schrijvers geven hun naam niet op, maar teekenen hun antwoord met een spreuk en zenden het met een vergezeld naambiljet, dat dezelfde spreuk aan de buitenzijde tot opschrift heeft, vrachtvrij aan den secretaris der Vereeniging te Padang; daarbij geven de inzenders een adres op, waaraan eventueele mededeelingen kunnen worden gericht.
- 4°. De inzendingen moeten vóór of op 1 Juli 1891 bij den secretaris zijn ingekomen; wat later wordt ontvangen, wordt onbeöordeeld ter zijde gelegd.
- 5°. De beoordeeling zal geschieden door een jury, bestaande uit dre leden, van wie er twee zullen worden benoemd door de Ned. Ind. Maatschappij van Nijverheid en Landbouw te Batavia, het derde door het bestuur der Vereeniging.
- 6°. De uitspraak der jury zal plaats hebben vóór of op den eersten Januari 1892.
- 7° . De jury heeft het recht aan een of aan meerdere inzenders slechts een gedeelte van den uitgeloofden prijs toe te kennen, doch gaat hiertoe niet over, dan na verkregen toestemming van den schrijver.
- 8°. De naambiljetten behoorende bij niet bekroonde antwoorden, worden ongeopend verbrand, terwijl de kopij ter beschikking blijft van de inzenders.
- 9°. Het bekroonde antwoord wordt het eigendom der Ned.-Ind. Maatschappij van Nijverheid en Landbouw, die het in haar tijdschrift zal opnemen of afzonderlijk het licht kan doen zien.
- ro°. Het bestuur der Ned.-Ind. Maatschappij van Nijverheid en Landbouw behoudt zich het recht voor ook met de schrijvers van niet bekroonde antwoorden in onderhandeling te treden omtrent de publicatie van die antwoorden in hun geheel of gedeeltelijk, op nader overeen te komen voorwaarden.

NIEUWE UITGAVEN.

AFRIKA, het land der toekomst en de Transvaal en zijne goudvelden, door S. J. Dutoit. Amsterdam, J. H. de Bussy 1890, 47 blz.

Met President Kruger en Generaal Smits kwam de heer Dutoit in October 1883 naar Europa, om de belangen der Zuid-Afrikaansche Republiek te bepleiten. Velen onzer waren toen in de gelegenheid met dien levendigen prater kennis te maken. In 1889 kwam hij naar Europa terug. Terstond trachtte het Bestuur van het Kon. Ned. Aardrijkskundig Genootschap hem over te halen, in eene openbare vergadering van het Genootschap, eene voordracht te houden over Zuid-Afrika, dat thans zoozeer en zoo volkomen terecht veler aandacht trekt. De heer Dutoit verklaarde zich daartoe bereid, maar werd door omstandigheden verhinderd aan zijne toezegging gevolg te geven en keerde in Juli j.l. naar de Transvaal terug, ons als afscheidsgroet het geschrift nalatende, waarvan de titel hierboven werd afgeschreven en dat we kortelijk wenschen te bespreken.

Vluchtig bespreekt hij daarbij tal van belangrijke punten, o. a. p. 9, de vraag: waarom de Europeesche volken en staten thans zoozeer wedijveren om het grootst mogelijk aandeel in Afrika te verkrijgen. "Spruit het voort uit een "Ahnung" of voorgevoel dat Afrika het land is der toekomst, het land voor hunne overbevolking en overproductie?....."

Dit kan het geval zijn, meent hij, omdat het binnenland een plateau vormt van 3000 tot 5000 voet boven de oppervlakte der zee, met een gezond, niet te heet klimaat en met een hoogst vruchtbaren bodem.

Om dat ontzaglijk groot, vruchtbaar en gezond land voor den Europeeschen ondernemingsgeest te openen, zijn niet anders noodig, maar ook volstrekt noodig om de groote afstanden en de weinige bevaarbare rivieren, dan spoorwegen.

Van dezer aanleg is de heer Dutoit een groot voorstander, maar men moet daarbij stelselmatig te werk gaan. Als stamlijn wenscht hij, p. 11, een spoorweg dwars door Afrika, als de ruggegraat, waarvan al de kustlijnen, oost- en westwaarts, slechts taklijnen zijn. Hij meent dat die lijn zal moeten loopen van Delagoabaai door de rijke noordelijke goudstreken van Transvaal, vandaar door het vruchtbare en rijke Mashonnaland, vandaar naar de pas geopende goudmijnen in Mozambique en vandaar langs de merenstreken over het Hoogland om met den Nijl af te dalen naar Egypte.

Hoewel toegevende dat het vermoedelijk nog wel eenigen tijd zal duren, alvorens men over dien spoorweg in acht dagen van Zuid-Afrika naar Europa zal kunnen reizen, acht hij dien hoog noodig om het uitgestrekte land tot ontwikkeling te brengen en betoogt verder, met aanvoering van heel wat cijfers, p. 13, dat wij op het gebied van handel, mineralen, landbouw en industrie reeds genoegzaam gegevens hebben om krachtig voort te gaan met den aanleg van spoorwegen in Afrika, dat, inzonderheid wat de Transvaal en aangrenzende landen betreft, behalve aan goud en diamanten en andere mineralen, ook overrijk is aan ijzer en steenkool.

Overgaande tot de vraag, p. 17, hoe is het uitgestrekte Afrika het best te openen voor de beschaving en het wereldverkeer? — komt de schrijver tot de conclusie, p. 20, dat daarvoor noodig is "geregelde nederzetting en geleidelijke voortgang, gelijk wij van het Kaappunt begonnen hebben"..... "met het vaandel van christendom en beschaving niet slechts hoog in de lucht te steken, maar waarlijk het onbewoond land bearbeidende en de barbaren beschavende, langzaam, maar daardoor des te zekerder". 1).

De heer Dutoit zegt verder, p. 21, dat de hoofdfactoren, waarmede men in de ontwikkeling van Zuid-Afrika te rekenen heeft, zijn: "een groote meerderheid van Naturellen, meest Kaffers, welke echter in zooverre vatbaar zijn voor beschaving, dat zij eene aanzienlijke werkkracht reeds uitmaken en bij toeneming zullen uitmaken in de toekomst, en daarboven de bijna gelijkstaande Hollandsche en Engelsche elementen, zich ontwikkelende in twee Britsche koloniën en in twee vrije Republieken, en (waartoe het ontveinsd) met een nog ietwat sterker Hollandsch element voor het tegenwoordige, maar met eene zooveel sterkere toeneming van het Engelsch element, dat het dus voortgaande, wel den boventoon zal moeten krijgen in korteren of langeren tijd" ²).

De schrijver wijst er vervolgens op hoe de Britten Zuid-Afrika weten te exploiteeren niet slechts door de macht van het kapitaal, maar ook door het bevorderen der immigratie. Jaarlijks, zegt hij p. 23, kan men rekenen dat 9 à 10,000 immigranten aankomen, van welken minstens drievierden Engelsch spreken. In die geregelde toestrooming van En-

¹⁾ Idyllisch voorgesteld! De geschiedenis leert, in Afrika zoowel als elders, dat de vooruitgang van het europeesche ras in zulke landen veelal gepaard gaat met heel wat liiden van de inboorlingen, omtrent wier lot de schrijver zich kennelijk weinig bekommet.

²⁾ Men herinnert zich dat de heer Dutoit om deze en soortgelijke uitdrukkingen, wearvan wij er nog een paar zullen aanhalen, van engelschgezindheid is beschuldigd.

gelsch sprekende immigranten ligt ongetwijfeld een gevaar voor het Hollandsch element in Zuid-Afrika. "Als het Hollandsch element niet van buiten wordt versterkt, zegt de heer Dutoit, moet het Engelsch element op den duur het winnen."

Daarin zou hij echter nog geen gevaar zien voor de vrijheid van zijn vaderland, omdat hij zich overtuigd houdt dat bij volksstemming 1) tweederden der blanke bevolking over heel Zuid-Afrika zich zou verklaren voor: "Een Vereenigd Zuid-Afrika met Britsche Kustbescherming", dat wellicht zou leiden tot de geheel vrije "Vereenigde Staten van Zuid-Afrika" want "een eigen land, een vrij volk, ziedaar het ideaal van jong Zuid-Afrika", zoo eindigt de heer Dutoit dit eerste gedeelte van zijn betoog.

Het tweede gedeelte draagt tot opschrift: "De Transvaal en zijne Goudvelden." Wij zullen den schrijver daarbij niet volgen, zeggen slechts dat hij daaromtrent tal van belangrijke cijfers en bijzonderheden mededeelt. Zijn slotwoord luidt aldus: "Vol van moed, vrij van zin, zien wij, pioniers, het jong Zuid-Afrika, terug tot het oud Europa, vanwaar wij afstammen en roepen: Komt! Hier ligt een werelddeel voor uwe overbevolking, een onafzienbaar veld voor uw handel en industrie, millioenen winst voor welbesteed kapitaal."

Dit zeggen ook telkens tal van mannen, die zich voor de ontwikkeling van Zuid-Afrika en de versterking van het Hollandsch element aldaar interesseeren. Inzonderheid de bestuurders der Ned. Zuid-Afrikaansche Vereeniging, wier ijverige Secretaris, Prof. C. B. Spruyt, niet moede wordt telkens in de jaarverslagen dier vereeniging en in de dagbladen aan te toonen hoe groot belang Nederland heeft bij de ontwikkeling van Zuid-Afrika, welk ruim veld dat land aanbiedt voor den Nederlandschen ondernemingsgeest ²).

¹⁾ Gevraagd zou echter kunnen worden: of de Engelsche regeering deze zou toelaten?

²⁾ De "Nieuwe Rotterdamsche Courant" van 27 September bevat het vierde of laatste eener reeks artikelen van Prof. Spruyt over "Transvaalsche Zaken". Daarin zegt hij o. a. minder gevaar te zien in de instrooming van Angelsaksische Vreemdelingen dan in de plaatsing van Millioenen Engelsch kapitaal in Transvaalsche ondernemingen en in den gebrekkigen toestand van het onderwijs in de Zuid-Afrikaansche Republiek. Komt Nijverheid, Mijnwezen en Handel geheel in Engelsche handen en worden de boerenzonen niet beter opgevoed, dan staat het te vreezen dat de hoogere standen in Transvaal binnen kort Engelsch zullen zijn. Dus: de Regeering houde de Engelschen buiten de ambtelijke wereld en neme de opvoeding krachtig ter hand. — Van Dutoit's Brochure sprekende, zegt de heer Spruyt dat deze zich in Holland en België voorstander heette van immigratie van Hollandsche boeren en Vlaamsche mijnwerkers, doch dat hij

Dat zijne en anderer opwekking vruchten dragen, blijkt uit de oprichting met Nederlandsch kapitaal van spoorwegmaatschappen, bankinstellingen, landbouw- en industrieele-ondernemingen enz., bestemd om in Zuid-Afrika, speciaal in de Transvaal, te werken.

De heer Dutoit toonde goed aan dat wij met kracht in die richting werkzaam moeten zijn, daarbij steeds bedacht op versterking van het Hollandsch element in Zuid-Afrika, wil dit zich niet op den duur door het sterk toenemend Engelsch element zien verdrongen. En daarom vooral vestigden wij de aandacht op zijn met warmte gesteld geschrift.

Ongetwijfeld zou de band tusschen Nederland en Zuid-Afrika nauwer worden toegehaald zoo de regeering der Transvaal aan het Kon. Ned. Aardrijkskundig Genootschap den gevraagden steun toezegde voor de uitzending eener geologische expeditie, omdat die Republiek dan aan Nederlandsche geleerden de bekendheid met hare bodemgesteldheid zon te danken hebben, welke nu nog zooveel te wenschen overlaat. Het groot belang van het door zulke expeditie in te stellen onderzoek is aangetoond in een, op uitnoodiging van het Genootschap door den heer G. A. F. Molengraaff 1) gesteld en naar Pretoria gezonden Rapport. Daaraan is ontleend de "Schets van de bodemgesteldheid van de Zuid-"Afrikaansche Republiek, in verband met die van Zuid-Afrika", opgenomen in de onlangs verschenen 3e aflevering van het 7e deel, 2e serie, van het "Tijdschrift van het Kon. Ned. Aardr. Gen.", welke reeds op zich zelve eene zeer belangrijke bijdrage tot de kennis van Zuid-Afrika vormt.

Moge het den heer Molengraaff, die onlangs voor particuliere zaken n. f. naar Zuid-Afrika vertrok, gegeven zijn de regeering der Transvaal ook door mondelinge bespreking van het nut van het in te stellen onderzoek te overtuigen. En moge voor Nederlandsche geologen de eer zijn weggelegd aan de bodemgesteldheid van Zuid-Afrika de bekendheid te geven, welke daaraan nu nog te zeer ontbreekt.

Den Haag, Sept. '90.

J. K. W. QUARLES VAN UFFORD.

zich volgens de "Pall Mall" in Engeland geheel anders uitliet en dat men door zijn boekje daaromtrent niet veel wijzer wordt.

¹⁾ Bekend geworden door het aandeel dat hij nam aan den onderzoekingstocht mas de West-Indische eilanden en Suriname, door de hoogleeraren Martin en Suringar en door de geschriften, welke hij daarover in het licht gaf.

HET VERSLAG van Mac Gregor over zijn tocht naar het Owen Stanley-gebergte.

20 April-eind Juni 1889.

Het Genootschap ontving onlangs, van Z. E. den Minister van Buitenlandsche Zaken, een van den Consul-Generaal der Nederlanden te Melbourne ontvangen exemplaar van een rapport door den administrateur van Britsch Nieuw-Guinea, Sir William Mac Gregor, aan de regeering van Queensland uitgebracht, over het tijdvak van 4 September 1888 tot 30 Juni 1889. Het bevat verschillende mededeelingen aangaande de afkondiging der Engelsche souvereiniteit, de administratie, de wetgeving, de rechtspleging, de administratieve inspectiereizen, de eigendommen van het gouvernement en het personeel; alsmede betreffende den handel, het zendingswerk, de financiën en den gezondheidstoestand op Nieuw Guinea.

Voor ons zijn het belangrijkst de bijlagen en de bij het verslag gevoegde kaart van een gedeelte van zuidoostelijk Nieuw Guinea, vervaardigd naar opnemingen en onderzoekingen, welke, vanwege het bestuur van Britsch Nieuw-Guinea, hebben plaats gehad; naar de Admiraliteits-kaarten en naar de onderzoekingen van Forbes en Cuthbertson 1). Wij vinden op die kaart — welke het gebied voorstelt tusschen 7° 45′—10° 15′ Z. B. en 146° 45′—149° 15′ O. L. v. Gr. — de Owen Stanley keten met de er op ontspringende rivier Vanapa, welke in de Redscar baai, aan de Z. W. kust uitloopt; van uit het Z. O. stroomt in diezelfde baai de Laroki rivier, die hare bronnen heeft in een ten Z. van de Owen Stanley keten liggend gebergte, welks ketens verschillende namen dragen; daar ligt ook de oorsprong der Kemp-Welch rivier, die in zuidelijke richting naar de Hood-baai stroomt, en aan hare rechterzijde, in den middelloop, eenige rivieren opneemt, welke uit de aldaar zich bevindende gebergten komen.

Uit de kaart blijkt dat de loop van vele rivieren met vrij groote nauw keurigheid bekend is; de Laroki-rivier neemt in den benedenloop rechts eene rivier op, de Brown-rivier, die nog bijna geheel gestippeld is geteekend; dit is ook nog het geval met vele gedeelten der kustlijn.

Onder de bijlagen verdienen vooral onze aandacht de wetenschappelijke verslagen aangaande de door Mac Gregor op zijne tochten gemaakte verzamelingen — hoewel deze laatste niet aan zijne verwachting voldaan hebben —

¹⁾ Zie ons tijdschrift, 1888, V, Versl. en Meded. p. 90, 427 en 428.

namelijk dat van Prof. A. Liversidge te Londen over het water der heete bronnen van Ferguson-eiland in de d'Entrecasteaux groep, en de verslagen van Jack, Clarke, Rands en Wilkinson betreffende de verzamelde gesteenten, waaruit nog niet genoeg gegevens zijn te putten voor een volledig overzicht der geologische gesteldheid van Z. O. Nieuw-Guinea en de nabijgelegen eilanden, maar die althans genoegzaam aan het licht gebracht hebben dat de palaeozotsche gesteenten, welke in Australië en elders de dragers zijn van goud en andere metalen, ook op die eilanden veel voorkomen, en dat bazaltlava er zeer algemeen is. De vogels — onder welke enkele nieuwe voorkomen, alsmede verschillende zeldzame soorten — en de kruipende dieren zijn verder beschreven door De Vis; de vlinders door Miskin; de schelpen door Hedley, terwijl Ferd. von Mueller een beknopt verslag geeft van de in het gebergte verzamelde planten.

Bijlage D bevat het uitgebreide verslag van Mac Gregor betreffende zijne inspectiereis van Manu-manu aan de kust naar het Owen Stanley gebergte, waarbij de bovengenoemde kaart behoort. Op p. 666 van dezen jaargang van ons tijdschrift is reeds medegedeeld dat Mac Gregor den 4000 m. hoogen Victoria-berg in de Owen Stanley keten heeft beklommen. De reis begon aan de Redscarbaai, vanwaar men de Vanaparivier opwaarts volgde; in weerwil van vele bezwaren, vooral van de zijde der inboorlingen die de goederen moesten dragen, slaagde men er in op den 28sten Mei, den Musgraveberg, welke een hoogte van 5588 voet (2135 m.) heeft, te beklimmen en den 11den Juni kwam men op den Victoria-berg. Het was niet altijd mogelijk de plaatsen te vinden welke door Forbes, die bij lange na niet zoo ver is doorgedrongen, worden genoemd.

De terugreis naar de kust duurde twaalf dagen. T.

De kaart der reis van kapitein Binger, van den Niger naar de Golf van Benin over Kong.

Carte du Haut-Niger au Golfe de Guinée par le pays de Kong et le Mossi, levée et dressée de 1887 à 1889 par L. G. Binger, Capne d'Infrie de Marine, par ordre de M. Étienne. Sous-Secrétaire d'Etat des Colonies. Echelle de 1:1,000,000.

Over deze zeer belangrijke reis zijn in dezen jaargang van ons tijd-schrift (p. 396 en 402) reeds eenige mededeelingen gedaan. Het Genootschap ontving dezer dagen van het Geographisch Genootschap te Parijs ten geschenke de groote kaart, welke door Binger, ingevolge de door hem gedane opnemingen, vervaardigd is. Een zeker aantal exemplaren

dier kaart waren nl., door het onder-secretariaat van Koloniën in Frankrijk, ter beschikking gesteld van het Parijsche Genootschap, ter uitreiking aan de verschillende aardrijkskundige genootschappen; zoo is ook ons genootschap in het bezit van die prachtige kaart. Zij is vervaardigd in vier bladen op de schaal van 1:100,000 en stelt het gebied voor tusschen 14° 30'—4° 40' N. B. en 12° 40'—1° 20' W. L. van Parijs.

De onder de heerschappij of het protectoraat van Frankrijk staande landschappen zijn donker *rose* gekleurd; de landen welke aan eerstgenoemde schatplichtig zijn of die onder Franschen invloed staan 1), hebben eene licht *rose* tint.

De veronderstelde waterscheidingen zijn door een afzonderlijk teeken aangegeven; evenzoo de noordelijke grens van den dichten, aaneengesloten plantengroei (végétation dense continue). Behalve Binger's eigen route zijn ook ingeteekend de routes, welke door andere reizigers zijn gevolgd (René Caillié 1828, Péroz en Plat 1885, Bonnardot 1889 e.a.).

De kaart bevat zeer vele namen van groote en kleine stammen en landschappen en van plaatsen, welke zijn verbonden door gestippelde lijnen, voorstellende de paden of wegen, welke men door inlichtingen bij de inboorlingen heeft leeren kennen (itinéraires par renseignements). Op een der kartons wordt de geographische ligging van achttien plaatsen opgegeven, (van vijf alleen de breedte) o. a. van Kong (8° 54' 15" N. B. en 6° 9' 45" W. L. v. P.), Salaga (8° 34' 16" N. B., de lengte is niet bepaald). Binger zegt omtrent een en ander het volgende 2): Mijne route is opgenomen met behulp der boussole Peigné en des nachts door middel eener boussole met lichtgevenden bodem (à fond lumineux). De groote moeielijkheid bestond in het gebruiken der instrumenten, zonder dat de inboorlingen het bemerkten van mijne chronometers, barometers en thermometers heb ik slechts gedurende de eerste vijftien of achttien maanden eenig nut gehad. Een der chronometerveeren is in meer dan vijftig stukken gesprongen, tengevolge der temperatuurveranderingen enz. Toen ik aan de Volta kwam, ten Z. W. van Salaga, gaven de barometers onderling verschillen in hoogte van 5 tot 600 meters aan; zoo lag bijv. eenig punt aan de rivier, volgens waarneming met het eene instrument, op + 260, met het andere op - 180, enz.

¹⁾ Kapitein Binger spreekt van: régions tributaires des pays de protectorat, ou situées dans la zône d'Influence française; men vindt hier dus het denkbeeld der Duitsche -Interessensphären" terug.

Men zie zijn verslag in Bull. de la Soc. d. Géogr. de Paris. 7me série, tome X,
 3me trim. 1889, p. 369.

In weerwil van al die bezwaren zou in den veelhoek, welken Binger van uit Kong, in 110 dagmarschen, heeft beschreven, toch slechts eene fout van 37 km. zijn; de totale lengte der met de boussole opgenomen route bedraagt omstreeks 4000 km., die van de "itinéraires par renseignements" ongeveer 50000 km., welke laatste mede vrij nauwkeurig moeten zijn, daar Binger er veel zorg aan heeft besteed en hij ze telkens opnieuw heeft nagegaan van uit verschillende punten en in andere landstreken.

Behalve het bovengenoemde karton heeft men er nog een, voorstellende de lagunes van Groot Bassam en Assinie (tusschen 4° 50' en 7° 20' W. L.), en een waarop de benedenloop der Comoé of Akba (zie ons tijdschrift, dezen jaargang p. 403) is geteekend (tusschen 5° en 7° N. B.). Het aantal stroomversnellingen is zeer groot; tusschen Toria en Malamalasso is de rivier volstrekt onbevaarbaar, zelfs voor de kleinste vaartuigen (pirogues); zij stroomt daar door rotskloven, die te eng en te kronkelend zijn dan dat men er door zou kunnen.

T.

Handbuch der mathematischen Geographie von Prof. Dr. Siegmund Gunther in München. Mit 155 Abbildungen. Stuttgart, Engelhorn 1890. Pr. 16 M.

Dit zeer lijvige handboek (het bevat niet minder dan 793 bladzijden) is het zevende in de rij der tot nog toe verschenen werken uit Ratzel's "Bibliothek geographischer Handbucher" 1). Zij die meenden in Epstein's Geonomie 2) reeds een zeer omvangrijke stof ter verwerking te bezitten, vinden hier een nog uitgestrekter arbeidsveld. Het is verwonderlijk welk eene uitgebreidheid zulke ondernemingen krijgen, wanneer zij eenmaal aan den gang zijn; in het aanvankelijke prospectus waren slechts acht werken aangekondigd en daaronder geen over mathematische geographie. Nu hebben wij er reeds zeven gehad en zijn er nog evenzooveel te wachten; onder welke een werk over de morphologie der aardoppervlakte door Penck, een over "Fluss- und Seenkunde" door den bekenden Bruckner, het tweede deel van Ratzel's Anthropo-Geographie enz. Zoowel de reeds verschenen als de nog toegezegde werken zullen aan Ratzel's onderneming, wanneer zij eenmaal voltooid zal zijn, eene hooge

¹⁾ Vlg. ons tijdschrift 1888, Versl. en Meded, p. 845 en 346.

²⁾ Ibid. p. 154. Het werk van Epstein maakt geen deel uit van de •Bibliothek geographischer Handbücher."

beteekenis geven. Men behoeft zulke handboeken niet achter elkander door te lezen, evenmin als de overzichten betreffende nieuwe reizen en publicaties, welke jaarlijks in de tijdschriften verschijnen. Zij zijn om nageslagen of voor een speciaal onderdeel bestudeerd te worden. De stand onzer kennis van een bepaald studievak en de richting waarin het beoefend wordt, worden er in weergegeven en men kan gerust zeggen dat de hoofdlijnen daarvan, gelijk ze in zulk een handboek worden geschetst, voor geruimen tijd vaststaan.

Behalve in den omvang verschillen de werken van Epstein en Günther ook in de wijze van behandeling der stof. Eerstgenoemde heeft er naar gestreefd een studieboek te leveren dat geraadpleegd kan worden door hen die geen eigenlijk hoogere wiskunde beoefend hebben; met de kennis van goniometrie en trigometrie, van gewone stelkunde en stereometrie kan men, bij de bestudeering van Epstein's werk, nagenoeg geheel volstaan. Günther daarentegen bespaart zijnen lezers niets van hetgeen er bij zijn onderwerp te pas komt; hij gaat, met behulp van differentiaal- en integraalrekening, van analytische meetkunde en hoogere stelkunde, recht op zijn doel af. Ook steunt de geheele wijze van behandeling van het onderwerp op historischen grondslag en op de geweldige litteratuurkennis van den schrijver 1), dien men daarin herkent als den bewerker der "Geophysik." Zijn arbeid draagt een volkomen wetenschappelijken stempel en ieder kan dus voor zich zelf uitmaken welk der twee werken hem, bij zijne bestudeering der mathematische geographie, het best zal passen. De hoofdstukken waarin Gunther's werk verdeeld is, zijn: I. Gestalt und Grösse der Erde (23 onderafdeelingen); II. Geographische Ortsbestimmung auf der Erde selbst (5 afdeelingen); III. Die Erde als bewegter Körper im Raume (10 afdeelingen).

Geographisches Jahrbuch, herausgegeben von Hermann Wagner, 1890, XIV Band. Erste Hälfte, Gotha, J. Perthes 1890²).

Deze eerste helft van het veertiende deel bevat de volgende overzichten: I. Ueber die Fortschritte in der geographischen Namenkunde. Von Prof. J. J. Egli in Zürich; II. Geographische Ergebnisse der wissenschaftlichen

¹⁾ Die trouwens niet altijd zijne bronnen rechtstreeks heeft geraadpleegd, maar somtijds mededeelingen doet uit de tweede hand, met name bij zijne bespreking der Nederlandsche geografen, waarbij hij Behm's (Wagner's) Geographisches Jahrbuch aanhaalt (zie p. 30).

²⁾ Vlg. ons tijdschrift 1889. Versl. en Med. p. 627.

Reisen, Forschungs-Expeditionen oder Landesaufnahmen in den aussereuropäischen Ländern; III. Bericht über die Fortschritte in der geographischen und topographischen Kenntniss der alten Griechischen Weh. Von Prof Dr. Gustav Hirschfeld in Köningsberg; IV. Die Fortschritte der Kartenprojektionslehren. Von Prof. Dr. S. Gunther in München. Het laatste hoofdstuk zal in de tweede helft van dit deel voltooid worden.

In hoofdstuk II worden de overzichten van Australië en Polynesië (1885-89) en van Afrika (1888 en 1889) gegeven door Prof. Dr. P. Hahn te Köningsberg, van Noord-Amerika (1887-89) door Prof. Dr. Franz Boas, te Worcester (Mass.) en van Romaansch Amerika (1887-1889) door Dr. W. Sievers te Giessen.

De Redactie ontving exemplaren van de volgende werken, ter bespreking in het tijdschrift.

De rivieren van Europa en de steden langs hare oevers door A. Brandes Sz., Leeraar aan de H. B. Sch. met 5-jarigen cursus tt. 's Gravenhage. Gorinchem, J. Noorduyn en Zoon 1890. Prijs f 1,50.

In dit werkje wordt een belangrijk gedeelte der topographie behandeld, nl. de ligging der steden ten opzichte van de rivieren; waarbij de schrijver. met groote zorgvuldigheid, zelfs heeft aangegeven of de stad aan den rechter of den linker oever der rivier ligt en welke hare hoogte-ligging is ten opzichte van den zeespiegel, alsmede bij welke plaats de rivier bevaarbaar wordt; dit laatste door een * voor den naam der plaats, bijv. *Krakau (l), Warschau (l), enz. Ook worden de grootere steden door groote, vette letters aangeduid en wordt daarbij opgegeven welke omstandigheden gunstig op hare ontwikkeling hebben gewerkt en in hoeverre die ook thans nog van kracht zijn. Gelukkig wordt de leerling niet overladen met allerlei niets ter zake doende bijzonderheden, welke zoo geschik: zijn om hem moedeloos te maken en in de war te brengen. Natuurlijk worden de belangrijke kanaalverbindingen niet vergeten en daar waar er nog al veel zijn genoemd heeft de schrijver aan den onderwijzer de vrijheid gelaten de meest belangrijke er uit te kiezen (zie o. a. p. 6), evenals met de vele zijrivieren zal mogen geschieden (p. 14 de zijrivieren vas de Oder, zooals de Bober, de Klodnitz (niet Klödnitz) en de Malapane), vooral bij eerstbeginnende leerlingen. Het werkje is zoo ingericht, dat men het in verschillende opvolgende klassen kan gebruiken. Dat de door-

loopende beschrijving der rivieren "van de bron tot den mond zich uit-"nemend leent om den leerling de ligging der steden onderling, dikwijls "ook de richting der aangrenzende gebergten en andere punten, uit een "topographisch oogpunt van groot belang, in het geheugen te prenten", zijn wij geheel met den schrijver eens. In dit werkje wordt natuurlijk slechts een gedeelte van de eigenlijk topographische beschrijving der landen geleverd, daar de orographie niet genoegzaam tot haar recht komt; maar de schrijver heeft niet meer willen geven dan juist die eenigszins uitgebreide rivierbeschrijving, daar het hem vooral er om te doen is, dat de leerling een helder beeld van de kaart zal krijgen, en het gebruik van den atlas, bij de bestudeering van het werk, "gebiedend noodig" is. Met dit leerboek alleen zal men bij het onderwijs niet kunnen volstaan en in deze opmerking ligt eenigermate een principiëel bezwaar opgesloten. Wat de spelling der namen betreft (voor zooverre het geen West-Europeesche namen zijn) zouden wij de voorkeur hebben gegeven aan de Hollandsche boven de Duitsche transscriptie; dit geldt, meer in het bijzonder, de Russische namen, als Petsjora, Wytsjegda, Mezen, Kazan enz. (niet Petschora, Wytschegda, Mesen, Kasan). Ook dit is nog een kwestie van opvatting, waaromtrent men kan verschillen, evenals over de vraag of het niet beter ware de Po als vr. in plaats van m. te beschouwen; maar eene gemengde spelling als "de Saxische Schweiz", in plaats van "die Sachsische Schweiz", of "Saksisch Zwitserland" is o. i. niet te verdedigen.

Op p. 6 wordt gesproken (onder d.) van een handelsweg der oudheid voor Indische waren, naar Nowgorod; welke uitdrukking licht tot misverstand aanleiding kan geven. Beter ware het geweest te zeggen dat de handel van Nowgorod al vroeg in de middeleeuwen ontwikkeld was (de stad bestond wellicht reeds in de 5de eeuw, terwijl Rurik er in 864 zijn zetel vestigde).

Aardrijkskunde van Nederland door A. A. Beekman; ten dienste van middelbaar en gymnasiaal onderwijs enz. Zutfen, W. J. Thieme & Cie. 1890. Prijs f 1,50.

Het eerste gedeelte van dit werk (vel 1 tot 6) is reeds besproken door P. Kat Pzn. in "De Vacature" van 12 Juni 1890, met wiens gunstig oordeel ik gaarne instem 1).

¹⁾ Het zij mij vergund den heer Kat opmerksaam te maken op eene bespreking van Croll's werk: Stellar evolution and its relations to geological time. London, Stanford 1889, door Dr. H. Hergesell, in Pet. Mitt. 1890, p. 198, waaruit hem sal blijken

Beekman heeft ditmaal aan den vorm en de correctie van zijn werk vrij wat zorg besteed, gelijk het in het algemeen, maar vooral bij een leerboek betaamt. Eene afzonderlijke beschrijving der provinciën geeft hij niet; evenals Schuiling behandelt ook hij de topographie in onmiddellijk verband met de bodemgesteldheid; zaakrijk zijn de eerste acht hoofdstukken in hooge mate. De beschrijving der polderlanden en van alles wat daarop betrekking heeft, alsmede van de rivieren en de zeegsten in verband met Beekman's Schoolatlas van Nederland, vormt, ak het ware, de kern en de reden van bestaan van het werk, daar het den schrijver voorkwam dat er — in weerwil der groote verdiensten van een paar reeds bestaande leerboeken — "ongetwijfeld nog verbetering was aan te brengen."

In hoofdstuk IX worden de volgende onderwerpen besproken: Nederland als geheel en met betrekking tot het buitenland; het klimaat en de bevolking. Dit alles wordt zeer kort behandeld en bevat veel algemeenheden; vooral is dat het geval met de beschrijving van het klimaat, die ook niet beantwoordt aan de eischen welke men daaraan tegenwoordig mag stellen. Uit een geographisch oogpunt ware ook eene uitvoeriger bespreking van de dichtheid en den loop der bevolking in de verschillende gedeelten des lands, en van de oorzaken daarvan (zelfs al nemen wij in aanmerking wat de schrijver daarover op p. 10 en 11 zegt), te verkiezen geweest boven de opsomming der tallooze kerkgenootschappen op p. 264. Het moet echter erkend worden dat de leerling, na aandachtige bestudeering van het geheele werk, zelf veel over de oorzaken van de verschillen in bevolkingsdichtheid zal weten te zeggen; maar leest men bijv. het artikel van Kuyper over Nederlands bevolking 1), dan komt men toch tot het besluit dat de bevolkingsstatistiek door Beekman wel wat stiefmoederlijk behandeld is. Alles bijeen genomen mag ten slotte gerust getuigd worden dat het aantal goede leerboeken over de aardrijkskunde van Nederland met een vermeerderd is 2). T.

dat eerstgenoemde geleerde den duur der geologische tijden op minstens negentig millioen jaren stelt, zoodat Beekman gerust vrijgevig kan zijn met zijne »jaarduizendes".

— De grootste diepte der wereldzee bedraagt, volgens tot dusver gedane peilingen, 8513 meters en wordt gevonden in den Noordelijken Grooten Oceaan op 44° 55' N. B. ea 152° 26' O. L. v. Gr. (Vlg. Pet. Mitt. 1889, p. 77). Hier is Beekman dus te vrijgevig geweest.

¹⁾ TAG. 1885, M. U. Art., 2° st., p. 240. — Men zie ook de overzichten welks Hoekstra in de laatste jaren in ons tijdschrift gegeven heeft van de bevolking van Nederland's gemeenten boven 10,000 inwoners.

²⁾ Aan het gymnasium zal de leeraar genoodzaakt sijn eene keus te doen uit de

Wandkaart van Nederlandsch Oost-Indië, door P. R. Bos, R. R. Rijkens en W. van Gelder. Schaal 1:2,000,000. Tweede herziene druk. Uitgave J. B. Wolters, Groningen 1890. Prijs f 15,25.

Java, door P. R. Bos, R. R. Rijkens en W. van Gelder. Schaal 1:500,000.

Beide wandkaarten, met keurige Grieksche randen, zien er goed uit; de zee is langs de kusten blauw gekleurd; de diepten zijn niet door kleuren maar hier en daar door cijfers aangegeven; de vuurtorens (bij Java) zijn geteekend met de zichtverheid in E. mijlen. De omtrekken der eilanden zijn duidelijk, met vrij dikke zwarte lijnen geteekend, in overeenstemming met het doel der wandkaarten; om dezelfde reden zijn ook de gebergten met donkerder tinten aangewezen dan op de kaarten in den atlas van Stemfoort en Ten Siethoff, aan welke de bergteekening overigens zeer sterk herinnert. De vervaardigers van de kaarten hebben dien atlas blijkbaar ijverig geraadpleegd, hoewel zij zich volstrekt niet altijd slaafs er aan gehouden hebben. Zoo komt de groep der Aroe-eilanden bij hen geheel overeen met die in den genoemden atlas; maar de Kei-eilanden wijken er van af en doen denken aan Lange's kaart in de Proceedings van Dec. 1888. De buitensporige grootte van het Tobah-meer op hunne kaart van Sumatra kan ik mij niet verklaren. Naar de door hen gebruikte schaal moest dat meer ongeveer half zoo groot zijn als op de kaart van Sumatra in bovengenoemden atlas; ook met Hagen's kaart in Pet. Mitt. 1883, T. 2 komt het niet overeen, evenmin als met kaart no. 9 in deel III der eerste serie van ons tijdschrift. De gedaante van het meer en de naam van het er in liggende eiland wijken eveneens af van de overige genoemde kaarten, die trouwens ook onderling verschillen 1). Dat de bergteekening, tengevolge van onze onbekendheid met de binnenlanden der meeste eilanden, veelal aan scherpte te wenschen overlaat mag niet verzwegen worden; zeer waarschijnlijk is het ook dat er op vele plaatsen (op Borneo, Nieuw-Guinea enz.) bergen zijn geteekend die in het geheel

omvangrijke stof; anders zou hij wel al den beschikbaren tijd voor de behandeling van Nederland in beslag moeten nemen.

¹⁾ De heer Bos deelde mij later mede dat het Tobah-meer op de wandkaart ontleend is aan het Koloniaal Verslag van 1888. Daar de afwijking aan de bewerkers der wandkaart zeer was opgevallen, had de heer Van Gelder daaromtrent inlichtingen ingewonnen bij officieren van den staf en aan het Ministerie van Koloniën, waar hem werd verzekerd, dat eene betere opneming van het meer was gedaan, tijdens de laatste expeditie naar de Tobah-landen.

niet bestaan. De bergteekening is, uit den aard der zaak, op de kaart van Java het best geslaagd. De kleurschakeeringen, vooral op de kaart van Sumatra, zijn somtijds erg bont en hard, maar dat is eene kwestie van smaak en ten deele ook weer een gevolg van het doel, waarmede de kaarten vervaardigd zijn. Het is echter te vreezen dat de leerlingen de rawa's voor bosschen zullen aanzien en meenen dat uitsluitend dáár het woud voorkomt 1).

De spoorwegen en enkele andere voorname wegen zijn op de eilanden met zwart-witte en met roode lijnen aangegeven, de verbindingen over zee, door de stoomvaartlijnen, komen echter niet op de kaarten voor. Hier en daar zijn drukfouten blijven staan, zooals op Bali: Djemb(r)ana, op N.-Guinea: Keizer Wilhe(l)msland.

Voor schoolgebruik, bij het klassikaal onderwijs, zijn de kaarten (vooral die van Java) zeer geschikt, wegens hare duidelijkheid en de vrij groote schalen waarop zij geteekend zijn.

De nauwkeurigheid der teekening is, over het geheel, voldoende; het aantal namen is zeer beperkt, hier en daar zelfs wel wat veel, bijv. op Zuid-Borneo, waar wel plaats geweest zou zijn voor de namen der landschappen, als Kotaringin, Amoentai en Martapoera enz., evenals ter oostkust de namen van Koetei, de Tidoengsche landen enz. wel zijn opgegeven.

T.

Nieuwe Schooluitgaven.

Beknopt leerboek der aardrijkskunde door D. Aitton, Leeraar aan het gymnasium te 's Gravenhage. — Tweede, verbeterde druk. Groningen, Noordhoff, 1890. Prijs f 1,30.

Onse planeet. Grondbeginselen der wis- en natuurkundige aardrijkskunde, ten dienste van Hoogere Burgerscholen, Normaalscholen en tot zelfonderricht, door Dr. H. Blink. Met 101 Platen en 15 Kaartjes in afzonderlijken Atlas. Tweede vermeerderde druk. Groningen, Noordhoff, 1890. Prijs compleet f 1,50.

Het beeld der aarde. Volledige Schoolatlas in 55 gekleurde kaarten en talrijke bijkaarten en kartons, door F. Bruins, Leeraar aan de Rijks-Kweekschool voor onderwijsers te Groningen. Vijfde, geheel omge-

In den atlas van Van Gelder (zie beneden) is de teekening van de streken langs de rivieren in oostelijk Sumatra beter geslaagd; de kleuren zijn daar ook minder hard.

werkte druk. — Groningen, Noordhoff. (Geen jaartal). Prijs compl. $f_{3,25}$; geb. in heel linnen band met titel $\dot{f}_{3,90}$.

Algemeene aardrijkskunde. Volledige atlas der natuurkundige geographie en volkenkennis, voor schoolgebruik en eigen studie, in 63 gekleurde kaarten, door F. Bruins, *Leeraar ens.* Groningen, Noordhoff. (Geen jaartal). Prijs f 1,80, in heel linnen band met titel f 2,40.

Uit Indië de aarde rond. Aardrijkskundig leerboekje voor de lagere scholen in Ned. Oost-Indië, door W. Van Gelder. Eerste deeltje, Ned. Oost-Indië, 78 pp. Derde herziene druk. Groningen, Wolters. 1890.

Schoolatlas van Nederlandsch Oost-Indië, door W. Van Gelder. Tweede herziene druk. Groningen, Wolters. 1890. Prijs f 2,50.

Atlas Sëkolah Hindia-Nederland, terkarang oleh W. Van Gelder. Tjitakan jang kadoewa. Groningen, J. B. Wolters, 1890.

De kaarten zijn goed uitgevoerd en duidelijk; de spelling der namen wijkt — ook in de Hollandsche uitgave — dikwijls af van de tot dusver gebruikelijke (Selebes, Seram, Bone, Bělitoeng, Soematra, Tjirěbon, Pariaman); somtijds wordt de juiste spelling onder de gebruikelijke opgegeven (Tapanoeli, Tapian Na Oeli) of wel de Inlandsche naam tegelijk met den Hollandschen vermeld (Buitenzorg, Bogor). — Bij de stoomvaartlijnen zijn de afstanden tusschen de plaatsen in E. M. opgegeven; de diepten der zee worden uitgedrukt in meters. Zeer nuttig, vooral voor een schoolatlas, zijn de verklaringen van verschillende Maleische woorden, als sělat (straat), danau (meer), těloek (golf of baai) enz. De hoofdwegen, de spooren stoomtramlijnen enz. zijn door verschillende teekens aangewezen.

Als grondslag voor het werk heeft de atlas van Stemfoort en Ten Siethoff gediend.

T.

NAAR AANLEIDING

VAN

"EEN NIEUW WERK OVER NEDERLAND" DOOR E2

DOOR

Dr. H. BLINK.

"Twee vakken, wier oorsprong wel is waar in het mythisch verleden ligt, doch welke eerst sedert luttele jaren in de rij der exacte wetenschappen zijn opgenomen: weerkunde en aardrijkskunde, stellen schijnbaar minder lastige eischen aan hare beoefenaars. Waarschijnlijk is dit de reden, waarom op beider terrein nog een menigte dilettanten zich bewegen."

(E2, Tijdschr. v. h. Kon. Ned. Aardr. Gen. 1890, No. 3).

Een philosoof, die zijn wijsgeerige stelling direct door het eigen voorbeeld bewijst, zegt zeker een groote waarheid. Het kan zijn, dat deze niet bijzonder nieuw is, noch het kenmerk draagt van groote scherpzinnigheid of diep inzicht in het wezen der zaak; als bewijs van zelfkennis drukt zij eene belangrijke persoonlijke eigenschap van den philosoof uit.

In die gelukkige omstandigheden verkeert blijkbaar zeker iemand, die, achter de letter E² zich verbergend, eene beoordeeling (?) van ons werk "Nederland en zijne Bewoners" in het vorig nummer van dit Tijdschrift gaf. En wij kunnen ons niet anders voorstellen, dan dat de heer E² in de woorden, die wij als motto van hem overnemen, een eerlijke biecht aflegt, vóór hij zich zelven waagt op het terrein, waar hij blijkbaar, zoo al niet geheel vreemdeling, dan toch dilettant is. Want op dien hoogdravende philosophischen aanhef volgt een drietal pagina's met zooveel vaagheid van dictie, zooveel oppervlakkigheid, zooveel onbeteekenende opmerkingen, die met het wezen der zaak niets te maken hebben, naast zoo weinig inzicht in het begrip der aardrijkskunde, dat zelfs de persoonlijke insinuaties, die de heer E² meent te moeten doen doorschemeren, aan zijn geschrijf geen belangrijkheid geven.

Op de lange inleiding der recensie (zij beslaat ruim 3 pag. van de 5, welke de geheele inneemt) mogen wij uit eerbied voor de aardrijkskunde

niet antwoorden en evenmin op de personaliteiten, omdat deze, onzes inziens, bij objectieve beschouwing der zaak geen dienst doen en ook in dit Tijdschrift niet te huis behooren. Zoo ook laten wij den geheelen toon der recensie voor de verantwoording van den schrijver, die zich aldus meende te moeten uitdrukken, en van de Redactie, die iets dergelijks plaatste.

Gaan wij daarom direct over tot de feiten, welke de heer E² noemt, en die als zoovele aanmerkingen op ons boek moeten gelden.

De heer E² begint zijne critiek met de opmerking: "dat het werk den geraamden omvang zal overschrijden. Op dergelijke wijze voortgaande worden de inteekenaars, evenals die op "de Waterbouwkunde" tot zeer veel grootere kosten genoodzaakt."

Dat die nuchteren opmerking na het hoogdravend begin over de wijzen der beoefening van de wetenschap enz., ons al zeer vreemd in de ooren klonk, behoeven wij niet te zeggen. In het Weekblad van den Boekhandel zouden wij iets dergelijks verwacht kunnen hebben, niet als eerste grief tegen het boek in het Tijdschr. v. h. K. N. A. Gen. Waar ons laten het verwijt wordt gedaan, dat de "historische ontwikkeling der kustlijn nog uitvoeriger behandeling wacht", klinkt dit al weinig consequent met het aandringen op beperking der stof, waarmede E² aanvangt.

Evenwel, E² verwijt ons "herhalingen". "Op pag. 12 vindt men de mededeeling der Rom. schrijvers over de oude riviermonden, die op pag. 363 weerkeert en volgens bladz. 405 nog een derde maal te wachten is."

Die bewering van E² is geheel onwaar en bewijst, op zijn zachtst gesproken, dat hij niet met aandacht het werk gelezen heeft. Op pag. 13 toch wordt bij de behandeling der kustlijn alleen geciteerd, wat de oude schrijvers over de riviermonden zeiden, in verband met de verbreking dier kustlijn, en op pag. 373 wordt de splitsing der rivieren binnen de Nederlandsche grenzen behandeld, en hoofdzakelijk geciteerd, wat daarover gezegd wordt. Wil de heer E² dit eene herhaling noemen, wij hebben geen lust daarover te twisten, doch blijven het ontkennen.

Zoo wordt op pag. 405 ook geenszins "herhaald", maar de "Geschiedenis van den Krommen Rijn" speciaal behandeld.

Verder: "Doch wat te zeggen van herhalingen van algemeenheden. Vermoeiend is soms het woord orographisch, dat op achtereenvolgende bladz. telkens 5 à 6 maal voorkomt."

Een belangrijke opmerking! — Wij geven een hoofdstuk (pag. 32) getiteld: "Algemeene oro-hydrographische toestand van den bodem" en vangen dit aan met eene paragraaf van 4 pag., bevattende "Algemeene

beschouwingen." Hierin wordt de beteekenis van de orographische gesteldheid des lands als deel van het geographisch geheel behandeld. Dat wij daarbij het woord "orographisch" "5 à 6 maal op een pag. gebruikten" is motief voor eene aanmerking. Of de heer E² juist geteld heeft, hebben wij niet nagegaan; wij laten dien verdienstelijken geographischen arbeid gaarne aan anderen over. Doch wij vragen bescheiden aan dien heer, of het hem mogelijk is, het woord, dat het onderwerp van behandeling uitdrukt, te vermijden? Daarenboven: op zijn hoogst zou het eene stylistische fout zijn, geen geographische. En eene "herhaling van algemeenheden" is het in elk geval niet.

De opmerking, dat de oorzaak van de verplaatsing der hoogwaterlijn, die wij mede toeschreven (pag. 23) "aan de verandering der hoogte van een gedeelte van het strand" "duidelijker uitgedrukt ware door "van positieve en negatieve of zee- en landwaarts verschuiving der waterlijn te spreken" komt ons voor niet juist te zijn, doch is in elk geval van zeer weinig beteekenis.

Dat de kust in hare historische ontwikkeling nog uitvoeriger behandeling wacht, zooals E² opmerkt, is juist. Wij behandelden dit onderwerp slechts in 't algemeen, om er bij de speciale beschrijving van gedeelten des lands op terug te komen. Ten opzichte van enkele gedeelten was dat reeds te bemerken, daar de afleveringen, die de Hollandsche en Zeeuwsche eilanden behandelen, ruim twee maanden verschenen waren vóór dat de recensie het licht zag.

"Bronnen, zooals de belangrijke opstellen in de V. K. I. I. van Caland en de bekroonde verhandeling van Van Nierop bleven onvermeld, daarentegen wordt voor eene algemeenheid, die weinig of niets met het onderwerp te maken heeft, Bluntschli's Staatslehre geciteerd", zegt de heer E².

De heer E² had wel gedaan de litteratuurlijst op pag. 416 op te slaan, dan zou hij daar het artikel van den heer Caland vermeld gevonden hebben. Ook aan den voet van pag. 444 vindt hij naar het artikel van Caland verwezen ¹). De bekroonde verhandeling van Van Nierop is ons werkelijk ontgaan. Wij danken voor deze opmerking, hoewel het feit ons niet nieuw was, toen wij gebruik konden maken van de Aard. Bibliographie, die bij de vervaardiging onzer copij nog niet bestond. Dat Bluntschli geciteerd werd voor eene "algemeenheid die weinig of niets met het onderwerp te maken heeft", zijn wij in 't geheel niet eens met den schrijver. Wij toch

¹⁾ In Juni verschenen de afleveringen, waarin deze pagina's voorkomen, en in September zag de recensie het licht.

hebben eene § gewijd aan algemeene beschouwingen over het begrip van "geographische grens" in onderscheiding van "staatkundige grens." Beide toch worden te veel met elkander verward, en als wij ons niet vergissen, waren wij de eerste, die dit in Nederland uiteenzetten, aan de hand der feiten in ons eigen land. Om nu het begrip "staatkundige grens" vast te stellen, meenden wij eerst te moeten aangeven, wat men onder staat te verstaan heeft. Hiervoor maakten wij vooraf studie van hetgeen deskundigen als de Bosch Kemper, Bluntschli e. a. daarover schrijven en citeerden hunne definities of opmerkingen. Wij meenden den logischen weg bij dit onderzoek te volgen en spreken beslist tegen, dat dit onderwerp met de zaak niet te maken heeft. — Doch veronderstel zelfs, dat bij de honderden bronnen, die wij vermelden, deze ééne van minder beteekenis was, gaf zij dan nog reden tot eene aanmerking?

De heer E² vervolgt: "De bronnen-opgaaf is veelal overstelpend, maar toch worden kaarten weinig of niet daarvoor opgegeven. Welk een gebruik, om bij de eerste onderafdeeling te blijven, zou te maken zijn van kaarten als bijv. Cruqius kaart van den Maasmond, de door Gedeput. St. van Noord-Holland uitgegeven en door J. F. W. Conrad samengestelde kaart van Huisduinen (1571, 1702, 1866) of van Egmond (1686, 1718, 1864)! Nergens wordt gewag gemaakt van aanwinst in vorige eeuwen langs de kust, evenmin van den dijk, welke Eijerland en Texel verbindt, noch van dien, welke den Helder aan Noord-Holland vastlegde, welken laatste de schrijver bijv. in de prototype van zijn werk: Le Francq van Berkhey's Nat. Hist. van Holland pag. 89 reeds had kunnen vinden."

Dat wij niet alle kaarten, welke wij gebruikten, vermeldden, is juist; de nieuwste kaarten hebben wij echter steeds genoemd. Wat de historische kaarten betreft, waren wij van plan achter in het werk een systematisch overzicht daarvan te geven met enkele opmerkingen. Doch wanneer de heer E² ons verwijt, dat wij de kaart van Cruquius niet kenden of niet gebruikten, zijn wij zoo vrij den beoordeelaar te verwijzen naar pag. 447 en pag. 449, waar hij op beide plaatsen het gebruik, dat wij van die kaart maakten, kan vermeld vinden. Zijn bewering is dus onwaar.

En wat betrest de kaarten en het werk van Conrad enz., als de heer E² een kijkje had kunnen nemen in de copij, die reeds een jaar lang op de drukkerij ligt, dan zou hij daarin gezien hebben, dat ook die kaarten wes degelijk gebruikt zijn. Eveneens zou hij daarin o. a. gevonden hebben eene geheel afzonderlijke § gewijd aan de Hondsbossche zeewering, eene § gewijd aan de geschiedenis der verbinding van den Helder aan het vaste land enz. Dit nu was den heer E² wel niet mogelijk te weten, doch wanneer hij

de kaart van ons land kent, zal hij toch moeten toegeven, dat, nu wij nog slechts het gedeelte ten zuiden van den Rijn, de Lek en de Nieuwe Maas behandeld hebben, wij onmogelijk dáár de historische ontwikkeling van Noord-Holland bij konden halen.

Het is dus wel een kunststuk van critiek, om thans reeds in verontwaardiging uit te roepen: "Nergens wordt gewag gemaakt enz.", nu nog het gedeelte verschijnen moet, waarin die leemten voorkomen.

Verder noemt de heer E² Le Francq van Berkhey's werk, de prototype van Nederland en zijne Bewoners ¹). Wij zouden wezenlijk geneigd zijn te gelooven, dat de heer E² een van beide werken niet gezien heeft, anders zou hij iets dergelijks niet beweren. Niet, dat de bewering ons onaangenaam is, integendeel, wanneer zij door een deskundige met grond uitgesproken werd, zouden wij haar gaarne hooren en aannemen, doch thans mogen wij dit niet. Voor het welwillend complimentje echter den heer E² onzen dank.

Verder: "Een conclusie, zooals aan het einde van dit hoofdstuk, dat de duinen afname in Zeeland geringer geweest is dan verder noordwaarts, kan slechts uit onvoldoende bronnenkennis verklaard worden. Het verlies bijv. van Wulpen en Scooneveld zou, behalve dat er natuurkundige gronden voor grooter verlies zijn aan te halen, reeds een andere beslissing wettigen."

De heer E² meent ons hier op eene fout te betrappen en het is de eerste, die hij "aanstipt." Het doet ons genoegen te vernemen, dat het vraagpunt der afneming van onze kust, hetwelk voor ons nog altijd onbepaald is, wat betreft de mate dier afneming, door E2 iets nader tot oplossing gebracht is. Wij moesten, toen wij het eerste gedeelte van ons werk schreven, nog steeds op de onzekerheid van de grootte dier afneming wijzen, en wij bekennen eerlijk, ook thans nog niet veel verder te zijn De heer E2 geest tegenover ons vermoeden (het is niets meer dan een vermoeden, hetwelk wij uitspreken, zie pag. 31 van ons werk) dat bij Holland die afneming grooter was dan in Zeeland, de verzekering van het tegenovergestelde, naar hij zegt op grond van historische bronnen en natuurkundige oorzaken. Doch dat wij meer dan deze verzekering wenschen en een grondig betoog daarover verwachten, zal ieder billijken. Met die enkele woorden is het vraagpunt niet beslist, en wij zien verlangend uit naar de bewijsen. Wanneer zij grondig zijn, zullen wij er gaarne later naar verwijzen, in het tegengestelde geval zullen wij ook onze meening

Le Francq van Berkhey's "Natuurlijke Historie van Holland" (alleen van Helland), verscheen in 1769—1779.

laar gaarne uitvoeriger tegenover stellen. Want tot de waarheid te komen s ons hoogste doel; wie daartoe iets medewerkt, reiken wij gaarne de hand.

Vervolgens treft ons het verwijt van de ongelijke behandeling der deelen; ,naast bepaald verdienstelijke historische behandelingen zoo bijv. die der Linge, staan andere, bijv. de verbinding tusschen Maas en Waal die op pag. 96 en 397 ter sprake komt."

Die opmerking is volkomen juist. Doch heeft de heer E² zich wel afgevraagd, of thans reeds eene geheel gelijkmatige behandeling van alle deelen in één uitvoerig handboek mogelijk is? Ziet hij de mogelijkheid n, alle deelen van ons land natuurkundig en historisch aan eene zelfstandige studie te onderwerpen? Heeft reeds iemand dit beproefd en is er voor alle deelen reeds genoegzaam vóór gearbeid om tot eene gelijknatige behandeling in een handboek te komen? Waarom heeft de heer E² ook bij de verbinding van Maas en Waal niet eenige bronnen genoemd, bij de verbinding van den Helder gaf hij er toch ook eene op? — Meent le heer E², dat het eerste handboek reeds onmiddellijk de volmaaktheid moet zijn, dan stelt hij een onbillijken eisch.

De heer E² zegt, dat wij algemeen waterloopkundige hoofdstukken gegeven hebben, "die voor een groot deel minder op zijn plaats zijn in een aardrijkskundig handboek van Nederland maar dan toch zeker achter de afdeeling D rivieren op pag. 52 dienden geplaatst te worden. Te meer daar § 11, pag. 231, zeker § 2, pag. 150, moest voorafgaan."

Omtrent het te pas komen dier zoogenaamde waterloopkundige hoofdstukken in dit handboek willen wij gaarne met een ernstig geograaf, die tevens de behoeften in ons land kent, redeneeren, doch de zaak in één zin uit te maken, komt ons niet wenschelijk voor. Dat wij somtijds eene later ingelascht hebben dan benoorde, is juist opgemerkt. Maar de recensent had toch moeten overwegen, dat wij bijv. bij de behandeling van de natuurkundige gesteldheid der rivieren geen voorbeeld hadden, waarnaar wij ons konden richten. (Het werk van den heer Fijnje bestond nog niet). Wij moesten eerst de stof opdiepen uit tal van tijdschriftartikelen, verslagen, brochures, boeken enz. enz. en na die gevonden te hebben stonden wij nog voor de vraag, hoe in logische orde eene rivier diende behandeld te worden? Waar wij zoo den weg moesten banen, wel met het hoofdplan in onzen geest, maar toch onder den arbeid nog steeds zoekend naar middelen om de details te verbeteren, gebeurde het wel, dat wij enkele malen onder het corrigeeren der proeven eene § later inlaschten, dan wij gewenscht hadden. In plaats van dit als eene aanmerking te vermelden, zou een werkelijk deskundige, bekend met de bronnenlitteratuur en den stand der geographische leerboeken en handboeken, gewezen hebben op de onmogelijkheid, om reeds in den eersten druk van een nieuw werk alles zoo te rangschikken, als dat kon gewenscht worden.

Voor E² schijnt die rangschikking der stof al zeer gemakkelijk, want van de moeiten daaraan verbonden, rept hij geen woord.

Verder wordt eene definitie op pag. 56 "niet fraai" genoemd. Voor ons weegt bij eene definitie zwaarder, of ze duidelijk en juist is. Of verder E² ook tevens als taalkundig en stylistisch beoordeelaar bevoegd is, durven wij niet beslissen, al waagt hij zich een enkele maal op dit gebied. Naar de taal en den stijl van zijn eigen artikel te oordeelen zou eenige zelkennis ook in dezen niet nadeelig zijn.

"Figuur 3" zegt recensent verder, "kan slechts dienen om onjuiste voorstellingen van Nederlandsche rivieren te veroorzaken." Die opmerking is volkomen juist maar niet bijzonder snugger. Want noch de schrijver, noch de teekenaar heeft er aan gedacht, hiermede eene voorstelling van eene rivier te geven.

— Wij hebben de opmerkingen en aanmerkingen in de recensie (?) op den voet gevolgd en zijn aan het einde. Het is eene onaangename en ondankbare taak zich met de weerlegging van dergelijke nietigheden bezig te houden en wij zouden er niet de minste aandacht aan geschonken hebben, had het artikel niet in het Tijdschr. v. h. Kon. Ned. Aardr. Gen. eene plaats gevonden 1).

Beter dan iemand zijn wij ons zelven bewust van de gebreken en leemten, die dit omvangrijke werk zullen blijven aankleven. Wij weten bij ervaring, welken arbeid het kostte, die talrijke bronnen in honderden tijdschriftartikelen, brochures, verslagen enz. enz. verstrooid, op te sporen. Hierbij kon het bijna niet anders, dan dat enkele artikelen aan

¹⁾ Het baarde bij bevoegde beoordeelaars wel verwondering, dat een der Redacteren van dit tijdschrift, de heer Timmerman, in zijn opstel, dat tot titel dragt: De vermeerdering der kennis van den aardbol gedurende het jaar 1889", en wasse men dus ook de resultaten der nieuwste beschouwingen over Nederland of deelem was Nederland diende te vinden, zich van ons werk afmaakte met het noemen van de titel en het verwijzen naar het artikel van E2. Wij vragen, of genoemde recansie deert kennen omtrent den inhoud van het werk? Wilde de heer T. cen oversicht was de svermeerdering der kennis" geven, dan mocht men met billijkheid daarin ook de verschillende nieuwe beschouwingen en resultaten (of althans enkele er van) uit os werk verwachten. Wezenlijk was daar niet ver naar te zoeken. Thans wordt een oorsprakelijk, op bronnenstudie berustend werk gelijk gesteld met het kleinste schoolbeekje over Nederland.

onze aandacht moesten ontsnappen, daar, zooals wij zeiden, de Aardrijksk. bibliographie van Nederland destijds nog niet bestond. Zelfs kostte het niet zelden veel moeite, de werken in handen te krijgen. Wij moesten in die bouwstoffen, voor enkele deelen in overvloed en voor andere zeer schaars voorhanden, den weg banen en vervolgens het werk naar een zelfstandig plan inrichten, waarbij ons in vele opzichten een voorbeeld geheel ontbrak. Dat alles vereischte meer dan "noeste vlijt", waarmede E² dien arbeid karakteriseert. Langdurig en ernstig nadenken, veel arbeid en belangrijke finantieele opofferingen kostten die arbeid den auteur. Niet zelden moest hij zelf verschillende plaatsen bezoeken om onderzoekingen in te stellen, en hij betreurt het, dat hem dit, om verklaarbare redenen, nog niet meer mogelijk was.

Hierdoor wordt evenwel de waarde van het boek voor de aardrijkskunde van Nederland niet bepaald. Doch zonder iets tot lof van eigen arbeid te willen zeggen, zijn wij zoo vrij er op te wijzen, dat Nederland en zijne Bewoners het eerste zelfstandige, geheel op bronnenstudiën berustende werk is over de aardrijkskunde van Nederland, dat in deze eeuw het licht zag. In deze omstandigheid meenden wij ook dan nog, wanneer wij bij de uitvoering in enkele opzichten beneden de te stellen eischen gebleven zijn, aanspraak te mogen maken op waardeering. In plaats daarvan wordt eene recensie geplaatst, enkel met aanmerkingen, die daarenboven, zooals wij aantoonden, van weinig of geen waarde zijn; eene aankondiging zonder eenige waardeering, maar in een toon van geringschatting geschreven, en daarbij nog ongeteekend. Dit alles voert tot het besluit, dat niet het boek zelf, noch de leemten in het werk, maar motieven daar buiten tot die veroordeeling aanleiding gaven. Voor degelijke opmerkingen van deskundigen zijn wij dankbaar; tegen bovengenoemde beoordeeling meenden wij ditmaal te moeten protesteeren. In 't vervolg evenwel zullen wij van dergelijk schrijven niet de minste notitie nemen.

Amsterdam, October 1890.

De Redactie meende verleden jaar de aankondiging van het toen verschenen gedeelte van Dr. Blink's werk te moeten opdragen aan een zaakkundig beöordeelaar. Zij wendde zich daartoe tot den heer E. ENGELENBURG te Utrecht, die zijne bespreking van dat werk (tot p 406) reeds in Februari II. inzond. De publicatie ervan werd, buiten toedoen der Redactie, door verschillende omstandigheden, vertraagd tot het begin van September.

De Redactie neemt overigens de verantwoordelijkheid voor de plaatsing in het tijdschrift van die recensie geheel op zich; zij heeft daarin geen personaliteiten noch insinuaties kunnen vinden en acht die ook ten eenenmale onwaarschijnlijk, daar de heer Engelenburg, gelijk uit zijn laatste schrijven aan de Redactie, dd. 15 Oct. II. blijkt, Dr. Blink persoonlijk volstrekt niet kent.

Ten slotte laat zij het oordeel over de vraag of in de kritiek dan wel in de anti-kritiek een gepaster toon is aangeslagen, alsook over de handelwijze der Redactie in deze, met gerustheid aan den lezer over.

DE REDACTIE.

Aardrijkskundige artikelen in verslagen van buitenlandsche Genootschappen en in Tijdschriften.

Europa.

W.	F.	Andriessen,	Die	Trockenlegung	der	Zuidersee.		. Mit	Karte.		
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BERICHT

ÜBER EINE IM JAHRE 1888-89 IM AUFTRAGE DER

NIEDERLÄNDISCHEN GEOGRAPHISCHEN GESELLSCHAFT

AUSGEFÜHRTE REISE NACH DEM

INDISCHEN ARCHIPEL

VON

ARTHUR WICHMANN

in Utrecht.

Am 18ten Juli 1888 schiffte ich mich in Marseille auf dem Dampfer "Soenda" der Dampfschifffahrtsgesellschaft "Nederland" ein, um über Port Said und Padang zunächst nach Batavia zu gelangen.

Konnte auch die mir gestellte Hauptaufgabe, nämlich die Erforschung der geologischen Verhältnisse der Insel Flores, durch eine Verkettung an sich beklagenswerther Umstände, deren Beseitigung jedoch nicht in meiner Macht lag, nicht im vollen Umfange zur Durchführung gelangen, so wurde dieser Ausfall mehr als reichlich dadurch vergütet, dass es mir vergönnt war, eine Reihe von Inseln zu besuchen, deren geologische Beschaffenheit zum Theil ebenso unbekannt war.

Noch im Jahre 1861 konnte F. von Richthofen bezuglich dieses Archipels den Ausspruch thun: "Bis jetzt ist meines Wissens noch nicht "eine einzige Formation sicher bestimmt und noch nicht ein einziges Genstein genauer untersucht worden").

Heutzutage ist derselbe glücklicherweise ein überwundener Standpunkt, obwohl noch massenhaftes Material zu weiterer Untersuchung einladet. Wenn der genannte Forscher fortfährt: "Aber auch manche der anzie"hendsten Fragen der Geologie, die Geschichte der Lander während der

¹⁾ Zeitschr. d. Deutschen geolog. Gesellsch. XIV, 1862, p. 353.

"letzten Perioden, die Geschichte ihrer Hebungen und Senkungen und "allmählichen Formveränderungen, die Auflösung von grossen Lander-"strecken in Gruppen und Reihen von Inseln, und dann wieder die zeit-"weilige Verbindung derselben zu ausgedehnten Festländern, die Absper-"rung früher über weite Länder verbreiteter Faunen auf einzelne Inseln "und ihre allmähliche Umgestaltung auf denselben, das Verhältniss der "einzelnen Inseln zu einander und ihrer Gesammtheit zu den Continenten "von Asien und Australien, bieten sich hier mit so viel Aussicht auf be-"friedigende Lösung, wie kaum anderswo", so stellt er damit ein Programm auf, dessen einzelnen Punkte noch immer der Erledigung harren, wenngleich viele schätzenswerthe Beiträge bereits geliefert worden sind. Auch die nachfolgenden Zeilen sollen Einiges zur Beantwortung der gestellten Fragen beisteuern, soweit dies in dem Rahmen eines Reiseberichtes möglich ist. Die Verbreitung der verschiedenen Formationen im östlichen Theile des Archipels ist noch nicht einmal in den rohesten Umrissen bekannt und es mag beispielwiese darauf hingewiesen werden, dass auf der kleinen Insel Rotti die bisher überhaupt unbekannten Schichten der alpinen Trias, sowie Fossilreste aus der Juraformation von mir nachgewiesen werden konnten, um zu zeigen, wie mancherlei weitere Aufschlusse noch zu erwarten sind. In weitaus geringerem Maasse sind derartige Resultate jedoch bei den Eilanden zu gewärtigen, welche sich an Java in östlicher Richtung als weitere Perlen des "smaragdenen Gurtels" anschliessen. Hier sind die Sedimente, welche sich um die alten Massengesteine lagerten, fast ganzlich abgenagt und an ihre Stelle sind Alles nberwuchernde vulkanische und koralligene Produkte getreten.

Eine besondere Ausmerksamkeit wurde den Angaben, welche die Lage der Ortschaften, Berge, Flüsse u. s. w., sowie deren Namen betreffen, gewidmet. Die Richtigkeit derselben konnte jedoch nicht in allen Fallen einer Prüfung unterzogen werden und so mag sich hier und da noch eine irrthumliche Bezeichnung eingeschlichen haben. Es ist selten Unwille, wenn die Eingeborenen einmal einen falschen Namen angeben. Die Höflichkeit, welche dieselben, und zwar jeder Classe und jedes Herkommens, gegen den Europäer zeigen, wird nur zu leicht die Veranlassung irgend Etwas auss Gerathewohl hinzuwersen, vielleicht auch dabei mit dem Hintergedanken die eigene Unkenntniss zu verhüllen.

Der nachstehende Bericht wird die folgenden Abschnitte umfassen:

1. Java. 2. Celebes. 3. Flores nebst Sumbawa, Solor und Adonara.

4. Timor nebst Pulu Samauw, P. Kambing und P. Burung. 5. Rotti.

Eine etwas ungleichmässige Behandlung derselben liess sich nicht ver-

meiden, wollte man nicht in eine Wiederholung des von Anderen schon Gesagten treten. Derartige vielbetretene Pfade durfen darum freilich noch lange nicht als ausgetretene bezeichnet werden.

Zu aufrichtigem Danke bin ich allen Beamten verpflichtet, die mir stets in so überaus freundlicher und zuvorkommender Weise die hülfreichste Unterstützung zu Theil werden liessen und die nachfolgenden Blatter werden noch häufig Gelegenheit geben dies im Einzelnen zu bekunden. In dankbarer Erinnerung aber bleiben mir vor Allem die Tage, welche ich in Gemeinschaft mit meinen Reisegenossen, Herrn Prof. Dr. Max Weber in Amsterdam und dessen Gemahlin, verleben konnte und deren hülfreiche Fürsorge die Erfüllung der mir gestellten Aufgabe sehr wesentlich erleichtert hat.

Niemand der herzlichen Antheil an Land und Leuten nimmt, wird sich dem Zauber entziehen können, den diese Inselwelt in der Gesammtheit ihrer Erscheinungen ausübt, und der sich in einem noch erhöhten Maasse geltend macht, wenn diese von Palmen umgürteten Gestade nur noch in der Erinnerung fortleben.

I. JAVA.

Die elektrischen Lampen, welche die Einfahrt des Hafens von Tandjong Priok erhellen, ergluhten bereits, als die "Soenda" am Abend des 20ten August 1888 in denselben einlief. Damit war altem Brauche gemäss das Signal zu einer allgemeinen, gegenseitigen Beglückwünschung gegeben. Begrüsste doch ein Jeder nach einmonatelangem Aufenthalt in dem Bauche des Schiffes freudig wieder den festen Boden, dieser den Busen geschwellt von hochfliegenden Hoffnungen, jener in stiller Resignation mit dem Bewusstsein innerhalb weniger Tage wieder in die Tretmühle wandern zu müssen. Bald lag der Dampfer fest vertaut an dem stillen, fast vereinsamten Quai. Der letzte Bahnzug nach Batavia war bereits abgegangen und so sollte uns das nunmehr in sicherem Port liegende Schiff noch eine Nacht beherbergen. Desto regeres Leben entwickelte sich in der Fruhe des folgenden Tages und bald waren Alle, welche die Bretter des Dampfers so lange Zeit zusammengehalten, auseinandergestoben. Im Gemeinschaft mit Prof. Weber, der mit dem ersten Morgenzuge zu meiner Begrüssung herabgeeilt war, ging es nach dem weit und gross angelegten Batavia und noch im Laufe des Nachmittages brachte uns der Schnellzug hinauf nach Buitenzorg.

Nachdem am nächsten Tage dem nie genug gepriesenen Botanischen Garten ein Besuch gewidmet worden war, sah uns der Morgen des 23 August bereits auf der Fahrt nach den Preanger Regentschaften. Während die alte beruhmte Poststrasse den Megamendung-Pass überschreitet und dort über Tjandjur in das Plateau von Bandong führt, geht der Schienenweg erst sudwärts, schwingt sich alsdann in einem grossen Bogen um den gewaltigen Gebirgsstock des Gunung Gedeh, um auf diese Weise gleichfalls Tjandjur zu erreichen. Von hier ab bewegt sich die Bahn in vorherrschend östlicher Richtung, bezwingt die Schluchten des Tji Sokan und Til Tarum und führt durch die fruchtbare und ausgedehnte Hochebene, bis sie zu dem in 714 m. Höhe gelegenen Bandong gelangt. Der Bahndienst auf Java muthet den Neuankömmling höchst angenehm an. Derselbe vollzieht sich mit einer Ordnung und Regelmässigkeit, wie man sie sich in Europa nicht besser wunschen kann, obgleich die Zuge ausschliesslich von Eingeborenen bedient werden. Kein wüstes Stimmengewirr erfullt die Bahnhofshallen und weder ein Herandrängen an die Billetschalter, noch an die Waggons findet statt, selbst dann nicht, wenn sich ein zahlreiches Publikum zur Mitsahrt einstellt. Nach 8 stundiger Fahrt war das volkreiche Bandong erreicht.

Vor Anbruch des folgenden Morgen begaben wir uns auf die Fahrt nach dem Tangkuban Prau, der mit dem Burangrang und dem Bukit Tunggul die Hochebene im Norden von Bandong begrenzt. Auf vortrefflicher Landstrasse bringen uns die von kleinen, munteren Pferden gezogenen Wagen schnell vorwärts. Es ist noch kühl und fröstelnd kauern die in ihre Sarongs gehüllten Sundanesen vor ihren Hütten. Bald begegnen uns Schaaren von Landleuten, die schweigend Bandong zuwandern, um die Erzeugnisse von Feld und Garten an den Markt zu bringen. Langsam steigt die Strasse an, welche zunachst über die alluvialen Ablagerungen der Ebene führt. Erst später stellen sich als Vorboten grobe vulkanische Conglomerate ein und nach 11/2 stundiger Fahrt halten wir vor dem Pasanggrahan von Lembang. Nach der Eintragung unserer Namen in das Fremdenbuch, werden die bereitstehenden Pferde bestiegen, um nunmehr dem Gipfel des Vulkanes zuzueilen. Zu beiden Seiten des Weges dehnen sich weite China-Anpflanzungen aus und nicht lange währt es, bis man inmitten derselben einen weissen Obelisken schimmern sieht, welcher den Ort anzeigt, wo die Gebeine Junghuhn's ihre letzte Ruhestatte gefunden haben. Wir befinden uns in 1281 m. Höhe über dem Meere. Unfern des Wegweisers, welcher die Aufschrift "Kraterweg" trägt, wird ein basaltischer Lavastrom überschritten. Im Uebrigen bestehen die Abla-

gerungen an den Gehängen des Tangkuban Prau aus lockeren Auswurfsmassen. Aus der Region des Chinabaumes gelangt man in die des Urwaldes, welcher letztere ununterbrochen bis zum höchsten Kraterrande anhalt, der sich bis zu einer Höhe von 2071,7 m. über dem Meere, 1357,6 m. über Bandong erhebt. Die Anlage des Pfades ist eine derartige, dass man erst am Endpunkte desselben angelangt, wo sich zugleich ein kleiner Pavillon befindet, plötzlich in die gähnende Tiefe des Kraters starrt. Dieser Ausblick allein ware der Ehre wurdig in dein noch zu schreibenden "Bädeker" von Java durch zwei Sterne ausgezeichnet zu werden. Der grelle Contrast, der unvermittelte Uebergang zwischen dem Grun des Waldes und den gebleichten Wänden des Kraters, in dessen Tiefen es unaufhörlich zischt und brodelt, bringt einen starken, nachhaltigen Eindruck hervor. Es sind wohl auch fast ausschliesslich Vulkane der Sunda-Inseln, welche mit ihrer bis zum Gipfel versehenen Waldbekleidung ein derartiges Bild dem Beschauer darzubieten vermögen. Unter diesen nimmt der Tangkuban Prau noch eine besondere Stellung ein, indem nämlich der elliptische Kraterrand, dessen lange Axe einen Durchmesser von 1420 m. besitzt, zwei fast gleich grosse, durch eine Mittelrippe getrennte Kratere umschliesst. Der östliche Kessel heisst Kawa Ratu, der westliche Kawa Upas oder Kawa Lanang 1). In dem erstgenannten befinden sich Fumarolen in lebhafter Thätigkeit und dichte Dampfwolken entsteigen den schlammigen Pfutzen am Grunde. Wir kletterten den zwar nicht gefahrvollen, aber immerhin steilen Pfad, welcher an der sich nach dem Kraterboden zu senkenden Mittelrippe entlang

Lanang = der Mann, resp. Männlich. — Valck übersetzt Ratu mit: weiblich. Sollte eine derartige Deutung zulässig sein - worüber mir kein Urtheil zusteht - so würde daraus hervorgehen, dass das Volk diese beiden Kratere als Mann und Weib bezeichnen wollte. Es ist jedenfalls eine bei allen Völkern vorkommende Erscheinung, dass zwei nebeneinander befindliche Naturgebilde von annähernd gleicher Gestalt Mann und Weib genannt werden. Unter den Vulkanen liefert ein Beispiel dieser Art der an der Südost-Ecke von Flores emporragende Lobetobi, dessen beide Gipfel die Namen -Lakilaki" und -Pärampuwan" erhalten haben. Ratu bedeutet eigentlich soviel wie Fürst, doch führt auch die Gemahlin des Sultans von Surakarta, sowie dessen älteste verheirathete Tochter diesen Titel. Junghuhn hatte daher ursprünglich Kawa Ratu mit «Königinkrater" übersetzt (Tijdschr. v. Ned. Indië 1843, I, p. 196), während Hochstetter einen «Königskrater" daraus machte (Reise der Fregatte Novara, Geol. Thl., Bd II, Wien 1866, p. 125). Ueber die Ableitung des Wortes Ratu vergl. J. Rigg, Verh. Bat. Gen. v. K. en W. XXIX, 1862, p. 399. Die Bezeichnung Kawa Upas (Opas) = Giftkrater findet sich meines Wissens zuerst bei S. Müller, Verh. v. h. Bat. Gen. XVI, Batavia 1836, p. 137.

führt, hinab. Dieselbe besteht aus einem Conglomerat, dessen Cementein rother Tuff ist, welcher durch die Einwirkung der Solfataren eine weitere Zersetzung erfahren hat. Ausserdem liegen am Abhange lose Auswürflinge, namentlich aufgeblähte, basaltische Schlacken umher, die von Eruptionen fangeren Datums herrahren. Am 174 m. unter dem südlichen Kraterrand liegenden Boden vereinigen sich beide Kratere, doch liegt die Kaza Ratu tiefer, indem sich dieselbe nach dem in der Südost-Ecke liegenden Schlammpfuhle zu senkt. Der Boden beider Kessel ist mit einer lichtgrauen feinerdigen Masse bedeckt, die einen aus Aschenmassen zusammengerührten, nunmehr erhärteten Schlamm darstellt, der in Folge der Eintrocknung Septarien-Ahnlich abgesondert erscheint. Aus zahlreichen, kleinen Oeffnungen in der Kawa Upas dringt heisser Schwefeldampf, sowie erstickende schwefelige Säure hervor. Bricht man eine solche Oeffnung auf, so zeigen sich die Wande des Kanals mit den zierlichsten Schwefelkrystallen austapezirt. Ziemlich in der Mitte dieser Kawa, doch mehr dem westlichen Absturz zu gelegen, befindet sich eine Schlammpfatze durch welche sich gleichfalls Solfataren einen Weg bahnen. Das Wasser besitzt in Folge des ausgeschiedenen Milchschwefels, sowie der aufwirbelnden zersetzten Aschenmassen eine weisslichgraue, trübe Färbung. Der Geschmack desselben ist stark sauer 1), seine Temperatur aber nicht wesentlich höher, als die der umgebenden Luft. Schroff und unerklimmbar sturzen die gebleichten Kraterwände im Süden und Westen ab; sie zeigen eine regelmässige, horizontale Schichtung und bestehen aus groben Basalt-Conglomeraten mit überlagerten Tuff- und Aschenmassen. Nur die nördliche Wand dacht sich allmählich bis zum Kraterboden ab und hier ruckt der Pflanzenwuchs bis zum Grunde vor. Die zeitweilig erhöhten Gasausathmungen haben jedoch zahlreiche Baume gleichsam wie mit einem giftigen Hauche überzogen, so dass die Zweige und Stämme blätterlos dastehen. Nur ein geringes Nachlassen der Solfatarenthätigkeit wird aber genugen, um das organische Leben, dem eigenen Triebe folgend, zu veranlassen das verlorene Gebiet zurückzueroberen.

Seit Beginn dieses Jahrhunderts ist der Tangkuban Prau von zahlreichen Reisenden besucht worden, so dass von ihm aussuhrlicher eBeschreibungen, als von irgend einem anderen Vulkane Java's existiren, so von Th. Horsfield 3,

¹⁾ Analysen der in beiden Kratern enthaltenen Wassers hat J. C. Bernelot Moens ausgeführt (Nat. Tijdschr. v. Ned. Ind. XXVIII, 1865, p. 322).

² Verhand. Bat. Gen. v. K. en W. VIII, Batavia 1816, p. 19.

S. Muller und P. van Oort 1), F. Junghuhn 2), P. Bleeker 3), F. von Richthofen 4), F. von Hochstetter 5) u. A.

Die einzigen bekannten Ausbruche dieses Vulkanes fanden im Laufe dieses Jahrhunderts statt und zwar dauerte der eine vom 30 Marz bis 4 April 1829, der andere erfolgte am 27 Mai 1846. Beide Eruptionen waren unbedeutend, und bestanden nur in einem Auswerfen von Aschen und losen Gesteinsbrocken. In beiden Fallen ging die Thatigkeit von der Kawa Ratu aus.

Eine besondere Ausmerksamkeit ward wiederholt der trennenden Mittelrippe geschenkt. Junghuhn hatte die Ansicht ausgesprochen, dass dieselbe erst in Folge der Eruption vom Jahre 1829 entstanden sei, da bei Horssield, der dem Berge im Jahre 1804 einen Besuch abstattete, nur von einem Krater die Rede ist. Eine derartige Annahme kann schon deswegen nicht als stichhaltig erachtet werden, da verschiedene Reisende, auch nach dem Jahre 1829, nur von einem Krater sprechen. Jede weitere Erörterung über diese Frage wird aber durch den Bericht eines Augenzeugen abgeschnitten, der den Vulkan am 27 September 1823 von Osten her bestieg. Hier auf dem Rand der Kawa Ratu stehend sah F. G. Valck einen im Westen dahinter liegenden Krater 6). Es ist auch leicht verständlich, dass von diesem Standpunkte aus, die von Sud nach Nord verlaufende Mittelrippe coulissenartig vorgeschoben erscheinen muss, während der von Suden her kommende Beobachter den gemeinschaftlichen elliptischen Kraterrand vor sich sieht.

Von einem Zwillingskrater im eigentlichen Sinne des Wortes kann man bei dem Tangkuban Prau nicht sprechen. An und für sich wäre es schon wenig denkbar, dass so dicht nebeneinander befindliche Schlote gleichzeitig thätig gewesen seien und auch andauernd bis zur gegenwärtigen Höhe der Kraterränder diese ihre Thätigkeit fortgesetzt hätten. Die Ablagerungen, welche an den Wänden der Kessel aufgeschlossen sind, erscheinen beiderseits so ausserordentlich gleichmässig ausgebildet, dass sie nur als die einem Eruptionskanale entstammenden Aufschüttungsmassen angesehen werden können. Der Berg ist zweifellos früher höher gewesen

¹⁾ Verhand. Bat. Gen. v. K. en W. XVI, 1836, p. 183.

²⁾ Java, II, Leipzig 1854, p. 36.

Tijdschr. v. Ned. Indië 1846, 8ste jaarg., II, p. 565; Nat. Tijdschr. v. Ned. Ind.
 I, 1850, p. 154.

⁴⁾ Zeitschr. d. Deutsch. geolog. Ges., XIV, 1862, p. 340.

⁵⁾ Reise der österr. Fregatte Novara. Geolog. Theil II, Wien 1866, p. 125.

⁶⁾ Tijdschr. v. Ned. Indië 1843, I, p. 182.

und der ursprüngliche Krater vielleicht gar nicht mehr vorhanden. Von den beiden an seine Stelle getretenen, darf man mit S. Müller die Kawas Upas oder Lanang als den alteren betrachten. Das Eruptionscentrum ist sodann später nach Osten gewandert und hat die Bildung der Kawa Ratu veranlasst. In einer geraden Linie mit den beiden Gipfelkratem folgt am Ostabhange die Kawa Domas 1) oder Kawa Badak 2) und noch weiter abwärts die Kawa Siluwan, welche aber nicht von uns besucht wurden.

Am folgenden Tage setzten wir die Fahrt von Bandong aus weiter fort. Die Bahn geht bis zu dem in fast gleichem Niveau liegenden Tjitjalengka unterbrochen durch die flache Ebene. Unendliche Reisselder liegen vor den Blicken ausgebreitet und gleich dunkelgrunen Tupfen leuchten zahlreichen Haine von Bambus und Cocospalmen daraus hervor, in denen sich wiederum die Dörser verbergen. Nach kaum einstundiger Fahrt war die Station Tjitjalengka und damit der Endpunkt der Bahn erreicht. Vor dem Bahnhofe standen Wagen bereit, welche uns in 31/2 stundiger Fahrt nach Garut brachten. Die über die Passhöhe nach Leles führende Strasse durchschneidet dürre unfruchtbare Strecken und geht fortwährend bergan, bergab. Bei Tjitaman wird der Weg so steil, dass wir aussteigen müssen. Endlich geht es hinab in die lachenden Fluren von Leles. Nachdem noch ein Ausläufer des G. Agung bewältigt worden ist, gelangen wir in das vom Tii-Manuk entwässerte Hochthal, passiren das kürzlich abgebrannte Trogong und befinden uns gleich daraut in Garut.

Der Assistent-Resident Herr Jhr. J. G. O. S. von Schmidt auf Altenstadt ermöglichte es durch seine in liebenswürdigster Weise getroffenen Anordnungen, dass wir bereits am nächsten Morgen den Aufstieg zum Tälaga Bodas unternehmen konnten. In der Frühe des 26ten August brachte uns ein Wagen nach dem ³/₄ Stunden in nordwestlicher Richtung entfernt gelegenem Pandaharan. Zu Seiten der Landstrasse wechselten Gemüseanpflanzungen, Djati-Gehölz (Tectona grandis, L), Areng-Palmen, Bambushaine und verschiedene Dörfer miteinander ab. In Pandaharan empfing uns der Wedänä (Distriktsvorsteher) mit seiner Frau. Während uns das Ehepaar mit einer Tasse Kaffe bewirthete, erschienen auch die zur Weiterbeförderung bestimmten Pferde. Alsbald schwangen wir uns in den Sattel und nun ging es auf einem schönen, von Hecken eingefassten

¹⁾ d. i. der Krater mit 800 Oeffnungen.

²⁾ d. i. Rhinoceros-Krater.

Pfade, der bald bergan führte, weiter. An steileren Stellen finden sich treppenartige Einschnitte, die von den gewandten Thieren mit Leichtigkeit genommen werden. Zur Linken gewahrt man die in jungem Grun prangenden Reisselder, welche ansteigen und dem Bergabhange möglichst viel Gebiet abzuringen suchen. Die schöne Pyramide des Singkub bleibt gleichfalls links liegen. Allmahlich gelangen wir in das Gebiet der Kaffe-und Tabaksanpflanzungen. Von der Höhe, wo dasselbe verlassen wird, bietet die von hellstem Sonnenlichte überfluthete kleine Hochebene eine herrliches Bild, welches durch die dieselbe umzingelnden Bergriesen einen besonders wirkungsvollen Abschluss erhält. Besonders deutlich tritt der plumpe mit einer Wolkenhaube versehene Gunung Guntur (der Donnerberg), sowie der charakteristische Kegel des G. Tjikorai hervor. Wir treten nunmehr in die Region des Urwaldes ein und ein tadelloser Waldpfad führt schliesslich nach 3 stundigem Ritte, an den einsamen, von bewaldeten Anhöhen umschlossenen Kratersee Tălaga Bodas (der weisse See). Nahe am Norduser desselben befindet sich in einer Höhe von 1724 m. über dem Meere eine geräumige Unterkunftshutte. Von hier aus lassen sich die verschiedenen Zacken welche den Rand des grossen, nach Norden durchbrochenen Kraters krönen, ubersehen. Im SSW. erhebt sich in einer Entfernung von 1700 m. die Spitze des Tjanar, welche 2192,6 m. hoch ist. Unterhalb desselben entspringt das den See nahrende Bachlein 1). In SOS. Richtung, 2100 m. entfernt, ragt der Wunwulan empor, der eine Höhe von 1940 m. besitzt und im O. gewahrt man in einem Abstande von 2200 m. den 1750 m. hohen Bungbulang. Seinen Abfluss hat das Kraterbecken in den Tji-Borom, während der Tji-Tălaga Bodas am Nordabhange entspringend, in keiner direkten Verbindung mit demselben zu stehen scheint. - Und nun zum See selbst! Regunglos liegt die weissliche Wassermasse da. Nackt und kahl sind die Felsen, welche nahe an sein Ost-Ufer herantreten, während im Süden und Westen die Ufer flach und bis hart an den Rand des Beckens mit Grun bekleidet sind, die höher liegenden Gehange sind überhaupt allseitig bewaldet. Der See besitzt einen Durchmesser von 600 m. und lässt sich in einer halben Stunde bequem umwandern. Wendet man sich vom Pasanggrahan aus nach Osten, so stösst man nach etwa 5 Minuten auf einen Abhang, an welchen früher Solfataren thatig gewesen sind. Eine Menge Thiere liegt umher, namentlich

¹⁾ Siehe die Skizze Fig. 1, Tab. I, welche im Wesentlichen der topographischen Karte der Preanger Regentschaften entnommen ist.

Heuschrecken, Wespen, Cicaden - sogar eine Mans wurde gefunden die alle den verderblichen Gasen entlegen sind 1). Das vorherschende Gestein (Augit-Andesit) ist murbe und fliegt durch einen Hammerschlag auseinander. In Folge der durch die schweselige Saure bewirkten Zersetzung sind die Blöcke haufig wie geborsten, oder aber auch sie zeigen eine Absonderung in einzelne Kugeln, die wiederum einen Aufbau aus einzelnen Schalen erkennen lassen. Lapilli, Bomben und ähnliche Ejektionsmassen sind nicht vorhanden. Eine eigenthumliche Erscheinung macht sich an diesem Orte, wie auch noch weiterhin am Gestade bemerkbar. Dort namlich, wo der gebleichte, lockere Tuff, welcher sich leicht vom Regen hinwegschwemmen lässt, von Auswürflingen schirmartig überdacht wird, bilden sich unter den letzteren Stylolithen-ahnliche Gebilde, indem die hierunter senkrecht abstürzende Tuffschicht mit lothrechten, untereinander parallelen Riefen bedeckt wird. Sie sind auf die gleiche Weise entstanden wie die Miniatur-Erdpyramiden, welche Hochstetter vom Tangkuban Prau2) und Junghuhn vom Kelut beschreibt3).

Wird der Weg weitere 5 Minuten verfolgt, so gewahrt man Solfataren in lebhaften Thatigkeit. Zunächst sieht man solche unter dem Wasserspiegel in der Nahe des Users hervortreten. Hier gewahrt man ein lebhaftes Aufbrodeln des Wassers unter Abscheidung von Mehlschwesel, welcher innerhalb einer scharf begrenzten Zone dem See eine stark weisse Farbung verleiht, während in dem übrigen Theile desselben sich nur eine milchige Trübung des Wassers zu erkennen giebt. Der Schwesel sammt dem emporgewirbelten Tuff schlägt zu Boden oder scheidet sich als schaumige Masse am Rande des Beckens ab. Es ist daher nicht, wie Junghuhn meint, der Alaun, welcher die Farbung des Wassers bedingt betraupt stellt der Tälaga Bodas keinen Alaun-See dar. Wo die Dämpse von Schwesel und schwessiger Saure aus dem Felsen hervorbrechen, da sind die Kanale mit Schweselkrystallen bekleidet.

Der Pfad führt weiter längs einer kleinen, sich in den See erstreckenden Halbinsel, worauf man an einen steilen Felsabhang ge-

¹⁾ In früherer Zeit hat man hier selbst verendete Tiger, Rhinocerosse, Hunde etc. gefunden (Junghuhn, Java II, 1854, p. 108), deren Todesursache nur in Kohlensäure-exhalationen zu suchen ist. Uebrigens enthält das Wasser des Sees auch jetzt noch freies Kohlendioxydgas, welches auf das Vorhandensein von Mofetten schliessen East.

²⁾ Reise der österr. Fregatte Novara. Geol. Theil, II, 1866, p. 127.

³⁾ Java, II, 1854, p. 468.

⁴⁾ l. c. pag. 107.

langt, welcher früher einmal den Schauplatz einer ausgedehnten Solfatarenthatigkeit abgegeben hat. Die dabei producirte Hitze muss eine so hohe
gewesen sein, dass der abgeschiedene Schwefel geschmolzen wurde und
sich Lava-artig am Abhange ergoss und dabei zugleich die herumliegenden
Gesteinsfragmente verkittete. Nicht allein C. G. C. Reinwardt 1), sondern
auch noch Mitte dieses Jahrhunderts, P. J. Maier 2) sind Zeugen eines
derartigen Vorganges gewesen.

An der Südseite wird das Ufer flach und morastig, doch geht man auch hier nicht vergeblich den Spuren vulkanischer Thätigkeit nach. Hart nebeneinander treten zwei Schwefelquellen auf, von denen eine heisses Wasser spendet. Am Rande des Beckens haben sich kleine Gypskryställchen abgeschieden. Die andere Quelle stellt eigentlich nur eine Pfutze dar, der zahlreiche Gasblasen (schwefelige Säure) entsteigen. Das westliche und nordwestliche Ufer bietet keinerlei bemerkenswerthe Erscheinungen dar.

Nachdem das Frühstück eingenommen worden war, wurde bald nach 12 Uhr der Rückweg angetreten. Bereits gegen 2 Uhr befanden wir uns in Pandaharan, um von dort, nach kurzer Rast wieder Garut zuzueilen.

Leider verhinderte mich Unwohlsein an der Theilnahme des Rittes nach dem Păpandajan, aber am 29ten war ich doch soweit wieder hergestellt, um mich dem Ausfluge nach der Kawa Manuk anschliessen zu können. Es war eine ganze Gesellschaft, die sich an diesem Morgen vor der Wohnung des Assistentresidenten ein Rendez-vous gab. Der Regent von Garut, Raden Tumunggung Ario Wiso Tanu Datur, hatte einen Wagen mit 4 Pferden gestellt, in welchem die beiden Damen Frau Prof. Weber und Fräulein von Schmidt auf Altenstadt Platz nahmen. Der Assistent-Resident folgte mit dem Regenten in einem zweiten, Weber und ich in dem dritten. Nach einstundiger, schneller Fahrt auf der ansteigenden Landstrasse wurde der Pasanggrahan Pasir Wangi erreicht, wo bereits verschiedene Wedana's und Mantri's harrten, um dem Regenten ihre Aufwartung zu machen. Komisch, aber durchaus nicht angenehm berührte die unterwurfige Haltung, welcher sich diese Leute befleissigten, die es selbst im Gehen noch fertig brachten Knixe zu machen, sobald sie angeredet wurden. Hinter uns folgen von jetzt ab eine Anzahl Dorfhäuptlinge zu Pferde, denen sich noch einige Kuli's anschliessen, um - falls es Noth thut - in die Speichen der Rader eingreifen zu können. Die Steigung

¹⁾ Verh. v. h. Batav. Gen. v. K. en W. IX, 1823, p. 26.

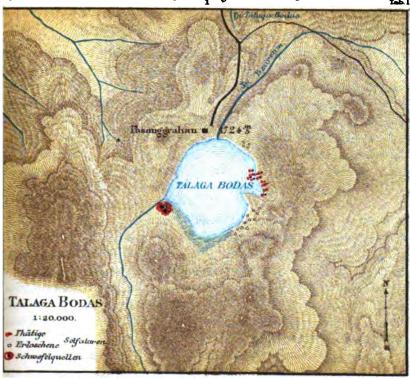
²⁾ Natuurk. Tijdschr. v. Ned. Ind., IV, 1853, p. 142.

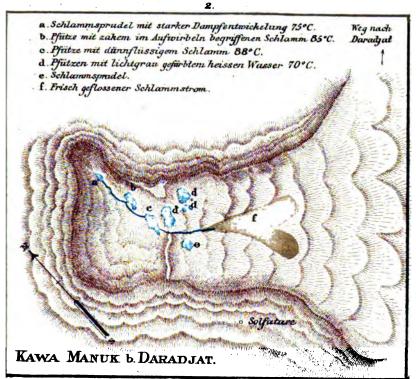
des Weges wird auch bald eine sehr bedeutende. Zur Linken stürzt die Schlucht des Tji-Bodas schroff ab. Zur Rechten sind in Folge einer vor Kurzem in Angriff genommenen Verbreiterung der Strasse ausgezeichnete Aufschlüsse in einem Rhyolith-Obsidian gewonnen worden 1). Dieses schöne Gestein, welches stellenweise auf das Reichlichste mit Sphaerolithen erfüllt ist, hat sich hier stromartig ergossen und ist wahrscheinlich das Produkt eines Spaltenvulkanes, am Abhange des Gunung Kiamis.— Inzwischen war uns Herr Doormans, der Verwalter der Chinaplantage Daradjat, entgegen gekommen, unter dessen Führung die Rest des Weges zu Fuss zurückgelegt wurde. In der Nähe der Plantage hört der Obsidian auf und an seine Stelle treten Tuffe, welche mit zahlreichen Andesit-blöcken erfüllt sind.

Um $\frac{3}{4}$ II Uhr langten wir in *Daradjat*, welcher Name soviel wie "höchste Glückseligkeit" bedeutet, an. Das Wohnhaus liegt auf einem Vorsprunge am Abhange und ist von einem Garten umgeben, der in dem herrlichsten Blumenschmucke prangt. Derselbe besteht fast ausschliesslich aus europäischen Ziergewächsen, welche in dieser hohen Lage (1700 m.) ganz vortrefflich gedeihen. Ein schmaler Pfad führt von hier bergaufwärts durch die China-Anpflanzungen, höher hinauf verschwinden dieselben und an ihre Stelle tritt dichter Wald. Nicht lange dauerte es, bis ein intensiver Geruch von Schwefelwasserstoffgas die Nähe der von uns gesuchten Stätte verkündete, und wir aus dem Walde tretend plötzlich in eine Schlucht gelangten. — Die *Kawa Manuk* (Vogelkrater) lag vor uns ²). Schroff stürzen die wenig hohen Wände nach der 5—6 m.

¹⁾ Der von P. J. Maier unweit des Pasanggrahan Pasir Kiamis aufgefundene Obsidian entstammt demselben Strome. (Nat. Tijdschr. v. Ned. Ind., VI, 1854, p. 30; XIV, 1857, p. 87). — Auch die im Tji-Manuk bei Garut so verbreiteten Obsidiangerölle sind demselben augenscheinlich durch den Tji-Bodas zugeführt worden.

²⁾ Bezüglich der Kawa Manuk herrscht einige Verwirrung in der Literatur, was vielleicht daher rühren mag, dass in dem Distrikt Timbang Antem, den Angaben von H. C. van der Wijck zufolge (Nat. Tijdschr. van Ned. Ind., XIV, 1857, pag. 222), drei Kawa's dieses Namens vorhanden sind. Die Lage der von S. Müller im April 1832 besuchten Kawa Păpandajan und Kawa Tjibodas (Verhand. over de natuurk geschiedenis der Nederl. Overs. Bezittingen. Land- en Volkenk. 1839—44, p. 457) kiest sich nicht genan feststellen. Zwar erachtet Müller diese beiden als identisch mit der von Junghuhn (Tijdschr. v. Ned. Ind. 1843, I, p. 219) erwähnten Kawa Manuk, wie dies auch Junghuhn später selbst thut (Java, II, 1854, p. 92). In diesem Falle jedoch kanu die Darstellung von Seiten Müllers keinenfalls eine richtige sein. Nicht allein zeigt die von P. van Oort angefertigte Kartenskizze (l. c. Pl. LXXX) nicht die mindeste Uebereinstimmung mit der von uns besuchten Kawa Manuk, sonders





•. Programme and the second secon

breiten Kluft ab, während der Boden terrassenförmig ansteigt. Am Eingange breitete sich zu unseren Füssen ein frisch geflossener Schlammstrom aus, welcher aus einem dunkelgrauen, zähen, aber noch plastischen Thon bestand 1). Die Produkte früherer Schlamm-Eruptionen waren hart und blätterig und hatten ausserdem eine lichtgraue Färbung angenommen. Der Boden war von netzförmigen Spalten, gleichfalls in Folge der Austrocknung entstanden, durchzogen. Die Abhänge der Schlucht bestehen aus einem lockeren Tuff, der zahlreiche Andesitblöcke enthalt und in der Nähe der Quellen finden sich Ausblühungen von Gyps und Halotrichit.

Eine Reihe kleiner Becken, deren Inhalt sich theilweise in einem siedenden Zustande befindet, ist in den Boden der Kluft eingesenkt. Ihre Vertheilung und Verbreitung ergiebt sich aus der Tab. II, Fig. 2 mitgetheilten, an Ort und Stelle entworsenen Skizze. Die in der aussersten Ecke besindliche Pfutze a stellt einen dünnssigen Schlammsprudel dar, der sich unter fortwährendem Aufwallen in lebhaster Dampsentwickelung besindet. Seine Temperatur beträgt 75° C. Der Schlammpfuhl b enthält einen kochenden Thonbrei (85° C.), dessen zähe Masse die Dampsblasen mit Gewalt durchbrechen, um alsdann, an der Oberstäche angelangt, zu zerplatzen. Die Pfutze c enthält einen dunnssigen Schlamm, welcher eine Temperatur von 81° besitzt. Diese 3 genannten Becken besördern ihre Produkte mittelst eines gemeinschaftlichen Rinnsales nach unten, wo sich dieselben in Gestalt von Schlammströmen ausbreiten. An der lin-

die auf derselben eingetragenen Quellen liegen thatsächlich weit von einander entfernt. Der Tji-Păpandajan entspringt nämlich am G. Kendang und die Kawa Manuk entlastet nur ihre Wässer durch ihre in südöstl. Richtung verlaufende Schlucht in denselben, stellt also nicht selbst die Quelle des Tji-Păpandajan dar. Der Tji-Bodas entspringt aber an dem entfernteren Puntjak Tjai.

K. Hasskarl besuchte die Kawa Manuk am 24 Sept. 1842 (Junghuhn, Java, II, 1854, pag. 93). Es giebt derselben eine Länge von ½ Paal (ca. 753 m.), womit aber die Länge der ganzen Schlucht gemeint sein muss, denn das eigentliche Gebiet der Schlammsprudel hat einen ausserordentlich geringen Umfang. — Später hat noch P. J. Maier diese Kawa besucht. (Nat. Tijdschr. v. Ned. Ind. IX, 1855, p. 123).

Die von Reinwardt im Jahre 1819 besuchte, ihrer Lage nach aber noch immer nicht bestimmte Kawa Kahara (A. H. van der Boon Mesch. De incendiis montium igni ardentium insulae Javae. Lugd. Batav. 1826, p. 41) ist zwischen dem G. Mäsigit und dem G. Kiamis zu suchen. In der Nähe der Quelle des Tji Karo giebt die topographische Karte einige Pfützen an, welche die Ueberbleibsel jener Kawa darstellen dürften. Westlich davon befindet sich der Sumpf Danu Tjiharus.

¹⁾ Siehe Tab. I, Fig. 2.

ken Seite des engen Thalkessels liegen ferner noch etwa ein halbes Duzend grösserer und kleinerer Tümpel d, welche eine gelinde Gasentwickelung wahrnehmen lassen und heisses, milchig-trübes Wasser (75° C.) enthalten. Jenseits der Rinne befindet sich ein Sprudel e, in welchem, wie in a, ein fortwahrend aufwirbelnder Thonschlamm sein Spiel treibt. Die ausseren Abhange der Schlucht sind bewaldet, nur an einer Stelle, wo eine vereinsamte Solfatare ihre Dampse ausathmet, wird der Vegetation das Herannahen verwehrt. Die Kawa Manuk liegt 242 m. höher als Daradjat, von welchem Orte sie in der Luftlinie etwa 2 Kilometer enfernt liegt.

Der Abstieg nach Daradjat ging schneller vor sich. Nachdem wir in dem gastlichen Heim des Herrn Doormans der Reistasel die gebührende Ehre angethan hatten, ward gegen 3 Uhr Nachmittags der Rückweg angetreten, und nach weiterer 21 stündiger Fahrt wiederum Garut erreicht.

Am folgenden Tage mussten wir leider von Garut Abschied nehmen, doch ward uns noch unter der kundigen Führung des Herrn D. R. J. Baron van Lijnden, welcher den Bau der Bahn von Tjitjaleng ka leitete!, die Gelegenheit geboten einen Theil des Bahnkörpers besichtigen zu können. Nachdem wir zu Wagen über Trogon bis Leles gefahren waren, stiegen wir an dem letztgenannten Orte aus und wanderten nach dem Abhange des Berges Kaledong, wo die Bahn in einen harten, grauen Augit-Andesit eingesprengt worden ist. Hunderte von eingeborenen Arbeitern waren mit dem Einebnen des Bahndammes beschäftigt, der noch zahlreiche Lücken auswies, da das Material zum Ueberbrücken der unendlichen Menge kleiner Wasserrisse noch nicht angelangt war. Das durch den



s. Augit-Andesit. b. Tuff. c. Lapilli.

Bahnbau erschlossene Profil ist ein selten eintöniges, der Charatter des Gesteines bleibt sich fast stets gleich. Erst kurz (etwa 100-150 m.) vor dem Kaledong-Past stellen sich regelmässige Tuff- und Lapilli-Schichten ein, mit welchen die Andesit-Masse abschliesst. Die beistehende Abbildung giebt diese

Profil wieder, welches noch dadurch die Ausmerksamkeit auf sich lenkt, dass die Knickung der Lapilli-Schicht durch einen grossen Andesitblock veranlasst wird. — Am Kaledong-Pass wurden die Fuhrwerke wiederen bestiegen, welche uns bis Nagrak brachten, wo ein Dienstzug unser

¹⁾ Dieselbe ist inzwischen (1889) dem Verkehr übergeben worden.

harrte. Mit diesem dampsten wir zunächst rückwärts bis zum Tii-Saat, wo man mit den Bau eines Viaduktes von 48 m. Weite beschäftigt war. Auch hier ist das Gestein ein Andesit, der aber his in das innerste Mark morsch geworden war. Nach Besichtigung dieses Ausschlusses ging es direkt nach Tjitjalengka, von wo aus Bandong mit dem Nachmittagszuge erreicht wurde. Am Abend des 31ten August kehrten wir nach Buitenzorg zurück.

Anfang September waren die erforderlichen Vorbereitungen soweit erledigt, dass wir den ersten nach Makassar abgehenden Dampfer benutzen konnten. Am 15ten des Monats verliess die "Japara" den Hafen von Tandjong Priok und langte bereits am Vormittage des 16ten auf der Rede von Samarang an. Da das Schiff hier während zweier Tage liegen blieb und ein gleiches Schicksal im Hafen von Surabaja bevorstand, so ward der Beschluss gefasst, die Reise nach dem letzgenannten Orte auf einem Umwege über Land zu machen, um auf diese Weise, einen, wenn auch nur flüchtigen Blick in das eigentliche Java zu werfen. Noch am Abend desselben Tages wurde Ambarawa erreicht und an dem folgenden ging es über Magelang nach dem Bårå Budur, dem schönsten, wenn auch in einem ruinenhaften Zustande befindliche Monument, welches das Eiland besitzt. Nach einem kurzen Besuche von Djokjakarta und Solo trafen wir am Abend des 19ten in Surabaja ein.

II. CELEBES.

In der Fruhe des 22ten September nahmen wir Abschied von Java. Ein Wagen des Hôtel Wijnveldt brachte uns nach langer Fahrt an den "kleinen Baum", den Landungplatz für die Jollen, welche den Verkehr zwischen den auf der Rhede von Surabaja liegenden Schiffen und der Stadt vermitteln. Gegen ½8 Uhr befinden wir uns wieder auf der "Japara", die wir am 16ten in Samarang verlassen hatten. Eine Stunde später hören wir die Ankerwinde rasseln und bald darauf dampfen wir ab, unseren Cours zunächst durch den Trichter und hierauf in die Madura-Strasse nehmend. Nördlich von uns befindet sich das langgestreckte hügelige, grüne Madura, dessen Küste hier und da entblösste gelbliche Kalksteinelsen zeigt. Allmählich entschwindet dieses Eiland, wie auch Java unseren Blicken, rings um uns erglänzte die spiegelglatte See im freudigen Sonienschein. Erst im Laufe des Nachmittages nähert sich das Schiff wieder

der flachen, langsam ansteigenden javanischen Küste, deren Eintönigkeit nur durch den vielfach ausgezackten Kegel des Ringgit mit seinem sich halbinselartig in das Meer vordrängenden Fuss unterbrochen wird. Abends gegen 9 Uhr passiren wir das Leuchtfeuer von Meinderts Droogte. Um die Annehmlichkeit der Fahrt noch zu erhöhen, begleitete uns während der Nacht ein Mondenschein, wie ihn so herrlich nur die Tropen zu spenden im Stande sind.

Am folgenden Morgen führt der Cours des Schiffes südlich von Puls Pandjang (Sepandjang), einer ziemlich niedrigen, stark bewaldeten Insel, vorbei. Nach zwanzigstündiger weiterer Fahrt tauchen bereits die ersten Inseln auf, welche die Westkuste des südlichen Celebes umsäumen. Unter diesen - die drei Gebruder genannt - ist Tana Kéké die grösste. Sie sind sämmtlich korallinen Ursprungs. Mehr und mehr nähern wir uns der flachen Kuste, Kampongs und Palmenanpflanzungen gleiten vor unseren Augen vorüber, während über die dahinter liegenden Berge sich ein undurchdringbarer Schleier ausbreitet. Eine weisse Häuserreihe, welche in der Ferne blinkt, kundet das Emporium des "grossen Osten" an. Genau um die Mittagstunde des 24ten laufen wir in den Hasen von Makassar ein und nachdem sich die "Japara" neben die "Sumbawa" gelegt hat, um die für den Timor-Archipel bestimmten Guter aberzuladen, erhaschen wir einen Tambangan, der uns sammt Dienerschaft und Gepäck ans Land befördert. Kaum eine Viertelstunde später haben wir bereits unser Quartier im "Hôtel Koningsplein" aufgeschlagen.

Makassar ist eine freundliche und bluhende Stadt. Gleich beim Betreten derselben von der Landungsbrücke aus gelangt der Besucher in eine prachtige Tamarinden-Allée, Hooge Pad genannt, welche in genan östlicher Richtung verläuft und den Ort gleichsam in zwei Halften zerlegt. An dieser Strasse resp. in unmittelbarer Nahe derselben befinder sich die wichtigsten Gebaude. Zur Rechten erhebt sich das fast unmittelbar am Hafen gelegene ehrwürdige Fort Rotterdam, dessen gewaltige Mauern immerhin dem etwaigen Anprall eingeborener Heerschaaren mehr als genugenden Widerstand zu bieten vermögen. Neben dem Fort dehm sich ein Wiesenplan aus, auf welchem die Kühe friedlich grasen Auch trägt derselbe ein nach allen Seiten offenes kleines Häuschen, welches dem Musikcorps als Uebungslokal dient. Bereits in der erstel Morgenfrühe schwingt da drinnen der wackere Kapellmeister seinen Taktstock und so geniessen die Bewohner den Vorzug das Programm eine Concertes Note fur Note entstehen zu hören, bis sich alles zu einen mehr oder weniger harmonischen Ganzen gestaltet hat. Jenseits der Wiese

steht die neuerbaute protestantische Kirche, hierauf folgen das Schulgebaude, ein kleines Schauspielhaus und sodann der grosse, grasbedeckte Konigsplatz, an dessen Saume sich einzelne hervorragende Baulichkeiten befinden, so der Justizpalast und das Heim des Clubs "Soranus", welches eine der besten der jenseits des Aequators gelegenen Kegelbahnen in sich birgt. Die linke Seite der Strasse ist fast gänzlich bebaut, ausser Laden und Privatwohnungen, liegen hier die Societat - selbstverstandlich Harmonie genannt -, die Verwaltungsgebäude, sowie der stattliche Palast des Gouverneurs und klingt endlich in den Europäischen Friedhof aus. Gar leicht gelangt man bei dem Beschauen der gewaltigen Steinmassen, welche die Gräber bedecken zu der Annahme, als ob der Schmerz um den Tod eines Angehörigen in Kubikmetern ausgedruckt wurde, aber in Wirklichkeit bekundet sich damit nur eine Anpassung an das Klima. Hölzerne Kreuzchen und andere Erinnerungszeichen wurden bereits nach Jahresfrist verzehrt sein, so dass man zu soliderem Material seine Zuflucht nimmt und in Ermangelung von Bildhauerarbeiten muss der mit Kalk beworfene Ziegelbau genügen. An der Kreuzungsstelle, dort wo sich die Wege nach Tallo und Gowa, N. und S. abzweigen, steht das Miniaturfort Vredenburg.

Den Pulsschlag van Makassar aber spurt man in der "Passerstraat", welche parallel dem Hafen in nördlicher Richtung verläuft, denn hier hat der Handel seine Schaffensstätte gefunden. Die massiven, mit Bogengangen versehenen Gebäude erinnern hinsichtlich ihrer Bauart an diejenigen südeuropäischer Städte. Mächtige Gewölbe beherbergen köstliche Produkte von Celebes und den Molukken. Auf ausgedehnten Böden wird der Kaffe verlesen, dessen Anbau jährlich zunimmt. Der Bewohner von Süd-Celebes ist nämlich besser daran, als sein javanischer Bruder, da er nicht wie dieser verpflichtet ist das Erzeugniss seiner Thätigkeit gegen einen festgesetzten, niedrig gestellten Preis an die Regierung abzuliefern. Hier wird das Dammar-Harz nach seiner Farbe, Reinheit und sonstigen Eigenschaften sortirt, dort werden in einem kahnförmigen, mit Kalkmilch angefülltem Troge Muscatnüsse umgerührt, um sie gegen die Angriffe von Insekten widerstandsfähiger zu machen. In jener Ecke lagern Haufen von Perlmuttermuscheln, welche die Aru-Inseln spenden und friedlich daneben Massen van Copra, der Versendung harrend. Wem es vergönnt ist tiefer einzudringen, der findet seine Augenweide an echten Perlen, Schildpad und farbenprächtigen Paradiesvögeln. Als Gegengabe bietet Europa Baumwollenzeuge, Eisenwaaren, Steingut u.s. w., von denen eine sorgfaltig geordnete Mustersammlung auf den Tischen in den Comptoirs aufgestellt ist. Lebhaft is das Treiben auf der Strasse — ein wahres Völkergemüse! Da sieht man ihren Geschaften nachgehende Europäer und Chinesen, buginesisches Handelsvolk, einheimische Verkäuser von Früchten und sonstigen essbaren Gegenständen, lasttragende und herumlungernde Kulis, auch dann und wann wohl einen der vielen Duodezfürsten oder Prinzen, der hier dem Müssiggange und anderen Lastern fröhnt, bis die Gelder ausgehen und sich keiner seiner Unterthanen mehr vorfindet, der angepumpt werden kann. Weiter nach Norden verliert sich die Passerstrasse in inlandische Kampongs, in welche sich überhaupt die Stadt nach allen Seiten hin allmählich ausflöst. —

Da der uns in Aussicht gestellte Dampfer des Residenten von Timor einer eingehenden Reparatur unterzogen werden musste, so hatten wir unsere ganze Hoffnung auf den Gouverneur von Celebes, Herrn D. F. van Braam Morris gesetzt, an den mein College Weber noch besondere Empfehlungen aus Buitensorg mitgebracht hatte. Und wahrlich wir wurden in unseren Erwartungen nicht getäuscht! Liess sich auch unser Wunsch, sobald als möglich nach Flores zu kommen, nicht ohne Weiteres zur Ausführung bringen, da der verfügbare Regierungsdampfer vorläufig anderweitig in Auspruch genommen war, so bot uns dafür Herr van Braam Morris die Gelegenheit in dieser Zwischenzeit eine Reise nach Wadjo zu unternehmen und auch später nach meiner Rückkehr von den kleinen Sunda-Inseln war es mir vergönnt, mich einem Ausfluge nach der Palos-Bai anzuschliessen. Ich erachte es als eine angenehme Pflicht dem genannten Herrn, auch an dieser Stelle meinen herzlichsten Dank für die auf so bereitwillige Weise gewährte Förderung meiner Studien und das stets für dieselben bekundete warme Interesse auszusprechen.

Einer unserer ersten Ausslüge führte uns nach den nordöstlich an der grossen Heerstrasse gelegenen Orten Tallo und Parang Lowe. Die flache, aber breite, aus zumeist alluvialen Ablagerungen bestehende Ebene, welche die Westkuste des südlichen Celebes umsaumt, dient hauptsächlich dem Anbau von Reis. Vielfach werden die Felder von Bambus- und Palmenanpflanzungen unterbrochen, in deren Schatten die Eingeborenen ihre auf hohen Pfählen ruhenden Hütten aufschlagen. Sobald man die Stadt verlassen hat, führt der Weg durch Reisfelder, alsdann über den mit einer Brücke versehenen Fluss Panampu. Nicht allein die Ufer desselben sind morastig, sondern ganze Strecken Landes stellen Sümpfe dar, welche als Salzgärten Verwendung finden. Grosse Haufen schönen, rein weissen Salzes liegen aufgeschüttet. Nach halbstündiger Fahrt ist das an dem gleichnamigen Fluss gelegene Tallo erreicht. Unmittelbar an der Fähre

liegt ein kleines Wirthshaus und von einem in den Fluss hineingebauten Pavillon hat man einen hübschen Blick auf das mit Rhizophoren eingefasste gegenüberliegende Ufer, während in weiter Ferne der Bulu Saraung (Pik von Maros genannt) scharf hervortritt. Während Weber auf den Fischfang ausging, begab ich mich unter der freundlichen Führung des Herrn Controleur W. J. Coenen zu Pferde nach Parang-Lowe. Die Fähre brachte uns über den 125 m. breiten Fluss, welcher hier noch vollständig unter dem Einfluss von Ebbe und Fluth steht. Am jenseitigen Ufer betritt man einen Damm, welcher auf eine Erstreckung von 21 Km. durch einen mit Rhizophoren bedeckten Sumpf führt. Beim Verlassen desselben gewahrt man zur Rechten Reisfelder, an deren Stoppeln einige Buffel ihren Hunger zu stillen bemüht sind, während zur Linken ein zäher Thon aufgeschlossen ist, welcher eine subfossile Muschelablagerung enthält. Die Zahl dieser Muschelreste ist eine so grosse, dass sie zur Beschotterung der Strasse verwendet werden. Bald tritt der "Kuristein" zu Tage, welcher sich noch weit über Parang-Lowe hinaus fortsetzt. Das Gestein ist so leicht zu bearbeiten, dass die Makassaren die hauptsächlich zu Grabsteinen verwendeten Blöcke direkt aus dem Boden herausschneiden. Ein besonderes Interesse beansprucht dasselbe dadurch, dass es einen leucitführenden vulkanischen Tuff darstellt. Nicht lange darauf kamen wir in Parang-Lowe an, wo sich ein Cantonnement für die Artillerie befindet, und war man gerade damit beschäftigt die Vorbereitungen für die hier stattfindenden Schiessübungen zu treffen. Vor Kurzem hatte man in diesem Lager einen Brunnen gegraben, mit dessen Ausmauerung man noch bei unserer Ankunft beschäftigt war. Die Tiefe desselben betrug 8,5 m. und war die Kuristeinschicht nicht durchstossen worden. Die N-S. streichenden Schichten desselben fallen unter einem Winkel von 5-10° nach W. ein. Bemerkenswerth sind in der nachsten Umgebung die zahlreichen Strudellöcher, welche in den Kuristein eingegraben sind. Ihr Durchmesser beträgt 2-4 m. In einem theilweise geöffneten Loche waren noch deutliche Rillen an den Wandungen zu erkennen. Meist sind die Löcher mit einem zahen Thon erfullt. Um 11 Uhr langten wir wieder in Tallo an und nach eingenommenem Frühstück ging es nach Makassar zurück.

Am 30ten September unternahmen wir eine Fahrt nach dem, besonders durch Wallace 1) in weitesten Kreisen bekannt gewordenen Orte Maros. Zu diesem Zwecke war eine Prau gemiethet worden, welche uns zunächst

¹⁾ The Malay Archipelago, London 1869, Vol. I, p. 366.

nordwärts über See und sodann den Fluss von Maros aufwärts nach dem Orte gleichen Namens zu bringen hatte. Gleich bei dieser ersten Benutzung inländischer Fahrzeuge machten wir die, zwar nicht erfreuliche, aber doch sich später stets wiederholende Erfahrung, dass Punktlichkeit eine den Eingeborenen gänzlich unbekannte Tugend ist. Erst um 7 Uhr Morgens ruderten wir aus dem Hafen, um nach Verlassen desselben das Segel aufzuspannen, welches, durch sanfte Winde leicht geschwellt, uns bald vorwärts brachte. Nach dreistündiger Fährt längs der flachen Kuste gelangten wir an die Mundung des Maros-Flusses, dem wie allen Flüssen von Sud-Celebes eine Barre vorliegt. Gleich darauf sassen wir denn auch fest, der Steuermann liess das hölzerne Anker auswerfen und erklärte auf Befragen ganz gemüthlich, dass die nächste, um 5 Uhr Nachmittags eintretende Fluth abzuwarten sei. Energisches Zureden von Seiten Weber's verhalf wenigstens zu einem Versuche das Fahrwasser des Flusses zu erreichen, was den redlichen Bemühungen der im Wasser watenden braunen Gesellen denn auch endlich gelang. Wir konnten uns inzwischen die Folgen eines solchen Festsitzens ausmalen und uns leicht vorstellen, mit welcher Sehnsucht jene Abtheilung Soldaten wohl der Erlösung geharrt haben mag, welche am 26 Juni 1872 in grösster Eile und zwar in Folge eines drohenden Ueberfalls in Prauen nach Maros bugsirt werden sollte, aber auf der bewussten Sandbank sitzen blieb und hier 24 Stunden lang ohne jeglichen Schutz gegen den glühenden Sonnenbrand und ohne Leibesnahrung ausharren musste 1). Die im Delta liegenden Inseln, sowie die Uferränder am unteren Laufe des Flusses sind vollständig mit Rhizophoren bekleidet. Weiter stromaufwärts werden die Ufer höher und freundliche Kampongs, welche mit Cocoshainen und Bananengärten abwechseln, zieren dieselben. Unaufhörlich ziehen kleine mit Reis, Töpferwaaren und anderen Erzeugnissen beladene Prauen abwärts, um noch vor Einbruch der Nacht Makassar zu erreichen. Im Wasser treibt sich badend und spielend ein grosser Theil der Bevölkerung, namentlich die liebe Jugend umher. Auch die Buffel nehmen mit sichtlichem Behagen an dem allgemeinen Bade Theil, lassen jedoch nur Augen und Hörner aus der Oberflache des Wassers hervortreten. Die zahlreichen, hier hausenden Krokodile scheinen ihrem Gewerbe erst nachzugehen, sobald die Sonne vom Firmament verschwunden ist. Wir sahen verschiedene Exemplare dieser widerlichen Geschöpfe sich auf Ufervorsprungen und Sandbänken sonnen. Halbwegs

¹⁾ P. B. van Staden ten Brink, Zuid-Celebes, Utrecht 1884, p. 218.

zwischen der Mundung und dem Orte Maros ragt inmitten des Flusses ein einsamer Kalkfelsen — Batu Puti genannt — hervor, auf welchen noch heutigen Tages Opfergaben niedergelegt, trotzdem die Bevölkerung sozusagen der mohammedanischen Religion huldigt. Die zahlreichen Krümmungen des Stromes bieten dem, vor allen Dingen zur Regenzeit massenhaft heruntergetriebenen Schlammmassen willkommene Anhaltspunkte zur Ablagerung dar, so dass sich in die Ecken und Winkel ein flaches Vorland hineinschiebt. Die Steilabsturze werden allmählich immer höher. Während die Höhe derselben im mittleren Lause des Flusses etwa 1 m. beträgt, erreicht dieselbe bei Maros den Betrag von 3—4 m. Das Material ist ein gelblich- bis graubrauner, meist sein geschichteter Thon, dem eine grosse Fruchtbarkeit inne wohnt. Der Maros-Reis ist denn auch, seiner vorzüglichen Qualität wegen, im östlichen Theile des Archipels besonders geschätzt.

Nach 8 stundiger Fahrt erreichten wir endlich Maros. Direkt über dem Landungsplatz erhebt sich das frühere Fort Valkenburg: Dasselbe wurde im Jahre 1737 errichtet, nachdem der Gouverneur Smouts den Kraeng Bonto-Lankasa, welcher ein Jahr zuvor in die nördlichen Provinzen eingefallen war, verjagt hatte. Dasselbe beherrscht die Strasse nach Makassar und hat zu Zeiten nicht geringe Wichtigkeit besessen. Die von einer Opuntienhecke umsäumten Wälle sind noch wohlerhalten. Ein Theil der Kaserne ist abgebrochen, der stehengebliebene dient den Pradjurits (inländische Polizeisoldaten) nebst deren Weibern, sowie den massenhaften Kindern und Hunden als Wohnung. Die früheren Offizierswohnungen bieten anderseits dem Reisenden ein gastliches Unterkommen.

Der folgende Tag war dem Wasserfalle Bantimurung gewidmet. In der Frühe führen wir auf einem, von merkwürdig widerhaarigen Pferden gezogenen Zweispänner ab. Zunächst ging es durch den Kampong und weiterhin an in Stoppeln stehenden Reisfeldern vorbei. Nach einer reichlich halbstündigen Fahrt hielten wir vor dem isolirt aus der Ebene emporragenden Kalksteinfelsen Bulu Sepong 1). Derselbe besitzt eine Höhe von 32 m. und ist 50 resp. 80 m. lang und breit. Schlinggewächse bekleiden ihn vom Kopfe bis zum Fusse; Spalten und Ritzen haben selbst Bäumen Gelegenheit zum Gedeihen gegeben. Auf schmalem Pfade kletterten wir hinauf und erreichten in etwa 10 m. Höhe den niedrigen Eingang zur Höhle. Die letztere stellt ein, nirgends Mannshöhe erreichendes

¹⁾ Bulu = Berg, sepong = alleinstehend.

Gewölbe dar, welches nach verschiedenen Seiten mit grossen Oeffnungen versehen ist, so dass auch in dem entlegensten Theile wenigstens Dammerlicht herrscht. Roh gestaltete Stalaktiten hangen von der Decke herab, zuweilen mit den vom Boden aufwärts strebenden Stalagmiten zu Säulen sich vereinigend. Der Boden ist ferner mit einer Kruste schmutziggrauen Kalksinters bekleidet, der zuweilen Melanien eingeschlossen enthält; zahlreiche Exemplare dieser Gattung liegen auch zerstreut umher. Möglicherweise sind dieselben verschleppt worden. Uebrigens findet man unter den überhängenden Felsen am Fusse desselben zahlreiche marine und gleichfalls abgestorbene Land- und Süsswassermollusken. Auch von lebenden Thieren wird dieses Felsenloch bewohnt. Aufgeschreckte Fledermäuse flattern umher, und ausserdem finden sich noch Gänge und Nester von Termiten, sowie Wespen. Bulu Sepong war zur Zeit der englischen Occupation (1814) zu einer Festung umgestaltet worden, die Spitze desselben krönte sogar ein mit unsäglichen Mühen hinaufgewundenes Geschütz. Eine traurige Berühmtheit hat dieser Berg noch dadurch erhalten, dass am Fusse desselben, am 18 October 1824, das unglückliche Gefecht gegen die in das Land eingefallen Boniresen stattfand, in welchem auch der Befehlshaber, Hauptmann Le Clerq, sein Leben einbusste. Jetzt ist das einst so mächtige Bone (Boni) zu einem Lehnsfürstenthum degradirt.

Wir setzten alsbald unseren Weg weiter fort. Vor uns tauchte eine lange Mauer auf, die gleichsam wie mit einem grunen Teppich bekleidet ist und sich meilenweit nach Norden erstreckt. Beim Näherkommen löste sich diese scheinbar compakte Masse in einzelne Burgen-ahnlich gestaltete Felsen auf, die allerseits schroff absallen. Dicht stehen dieselben zusammengedrängt, meist nur durch tiefe Schluchten unterbrochen, durch welche die Wassermassen ihren Abfluss finden. Diese Felsenlabyrinthe sind von Alters her die willkommenen Schlupfwinkel für die celebesianischen Rinaldo Rinaldini's gewesen und haben auch als unnahbare Zufluchtsorte für aufrührerische Häuptlinge gedient. Unweit des Einganges einer solchen Schlucht hörte der Fahrweg auf und ein Fusspfad führte längs einer Felswand nach dem Wasserfalle Bantimurung. Zunächst sahen wir am Fusse des Felsens eine Quelle in zwei mächtigen Armen hervorbrechen. Man war gerade damit beschäftigt einen alten Kanal auszugraben, um auf diese Weise das vortreffliche Wasser dem volkreichen Maros wieder zuzuführen. Weiterhin gelangt man an die bereits von Wallace bewohnte Unterkunftshutte, welche hart an dem Flusse liegt, der einestheils von dem aus dem Wasserfalle niederstürzenden Wassermassen, anderentheils durch diejenigen eines kleinen Baches gespeist wird. Zur

Mittagszeit kommen hier die Affen (Macacus maurus, Cuv.) 1) hinunter, um ihren Durst zu löschen. Bei dem Bantimurung selbst stossen die Felsen fast zusammen. Ein schmaler Pfad führt in die Spalte, aus welcher sich der Wasserfall ergiesst, hinauf; weiter hinten befindet sich noch ein zweiter kleinerer Fall. Da wir uns dem Ende der Trockenzeit näherten waren die Wassermengen höchst unbedeutend, unvergleichlich schön war dagegen die ganze Umgebung. Inmitten dieses vom uppigsten Pflanzenwuchse erfüllten Kessels umschwärmten uns eine Menge von Schmetterlingen, wie sie in gleicher Anzahl und Pracht wohl an wenigen Punkten der Erde vorkommen durften. Hunderte von Metern hoch erheben sich die schroffen, namentlich mit Kemiribaumen (Aleurites triloba, Forst.), sowie mit Schlinggewächsen bekleideten Felsen. Wo die letzteren überhangen, meint man das nackte Gestein zu schauen, bei nahere Betrachtung gewahrt man jedoch, dass es Stalaktiten sind, riesige, plumpe Zapfen, welche einzeln oder in Gruppen herunterhängen und nur den bescheidenen Flechten als Substrat zu dienen geeignet sind. Der im Bruche schneeweise Kalkstein ist meist feinkörnig bis dicht und besitzt im Allgemeinen keinerlei Fossilreste. Nur ein glücklicher Zufall spielt einige vor völligem Untergange bewahrte Korallen in die Hand. Denn dass wir es hier mit früheren Korallenriffen zu thun haben, daran dürste nicht zu zweiseln sein. Es darf in dieser Beziehung nur auf die lichtvolle Darstellung von Richthofen's verwiesen werden 2). Allem Anscheine nach sind diese tertiaren Gebilde nicht junger als miocan 3). Durchbruche von Eruptivgesteinen werden in dem Gebirge wiederholt vermeldet, das am Bantimurung in Gestalt von Geschieben vorkommende ist ein Plagioklasbasalt.

Unser Wirth aus der Feste Valkenburg hatte uns begleitet und die Zwischenzeit dazu benutzt ein Mittagessen zu bereiten, welches wir in der Unterkunftshütte einnahmen. Erst in später Nachmittagsstunde langten wir wieder in Maros an.

Am 3ten October kehrten wir nach Makassar zurück und vernahmen am folgenden Tage, dass die Fahrt nach dem Innern von Celebes bereits am 6ten vor sich gehen sollte. In aller Eile wurden die für die zu besuchenden Herrscher bestimmten Geschenke, sowie kleinere Spenden, welche als Ent-

M. Weber, Zoologische Ergebnisse einer Reise in Niederl. Ost-Indien, I, 1890,
 103.

²⁾ Zeitschr. d. Deutschen geolog. Gesellsch. XXVI, 1874, p. 248.

S. Schreuder hält dieselben für jurassisch, doch ist dies eine gänzlich willkürliche, durch Nichts begründete Annahme (Natuurk. Tijdschr. van Ned. Indië, VII, 1854, p. 391).

gelt für etwaige Gefälligkeiten seitens Personen niederen Ranges berechtnet waren, unter der liebenswürdigen Führung des Herrn L. A. Stelling eingekauft. Sodann wurde für die Erwerbung der Lebensmittel und Getranke Sorge getragen, welche in die bekannten rothen Kisten verpacht wurden, die ursprünglich aus Holland kommend mit Jenever gefüllt gefüllt gewesen waren. Dieselben sind für Reisezwecke sehr geeignet, zumal die eingeborenen Lastträger Behalter von grösserem Umfange nur schwierig durch das Gebirge zu befördern vermögen.

Am sestgesetzten Tage lag der Regierungsdampser "Sperwer" unter dem Commando des jovialen Capitans W. C. Meyer im Hasen bereit uns nach der Bai von Pare Pare zu bringen. Es war eine stattliche Gesellschaft, welche sich an Bord des Schiffes zusammengefunden hatte. Als Leiter des Ganzen trat Herr Assistent-Resident G. F. A. Brugman auf, dem der Auftrag zu Theil geworden war, das noch stets unabhängige Reich Wadjo zu einem Contracte mit der Indischen Regierung zu veranlassen. Seine Kenntniss von Land und Volk sind uns im weiteren Verlaufe der Reise von dem grössten Nutzen gewesen und spreche ich demselben auch an diesem Orte meinen herzlichsten Dank für die stets gewährte Hulfe aus. Sein Bruder Herr L. Brugman fungirte als Dolmetsch. Ferner nahm officiell an dieser Expedition noch ein eingeborener Sendbote Theil, welcher zugleich die Rolle eines Schreibers spielte. Darauf folgte noch ein ganzer Tross. Es ist eine bei den Makassaren und Buginesen besonders schart hervortretende Eigenschaft mehr scheinen zu wollen, als sie wirklich sind. Jener ebengenannte Schreiber hatte sich seinen beschäftigungslosen Bruder mitgenommen, der ihm Knappendienste leisten musste und dem er jede nicht unbedingt selbst zu verrichtende Arbeit auftrug. Dieser hatte sich wiederum einen Mann aus dem ersten besten Kampong aufgegriffen, der ihn als Diener begleitete und so ging das mit Grazie weiter. Man erhalt auf diese Weise eine Vorstellung von den gewaltigen Menschenmengen, welche in Bewegung gesetzt werden, wenn sich Fürsten besuchen und zugleich wie die Ortschaften durch derartige Besuche ausgesogen werden. Ausser Prof. Weber und seiner Gemahlin, reiste auch noch der Pangeran Lasasso mit. Sein Grossvater war der berühmte Dipå Negårå, das Haupt des im Jahre 1825 hell auflodernden javanischen Aufstandes, welcher erst nach seiner 1829 erfolgten Gefangennahme endete. Nach Celebes verbannt, starb Dipå Negårå im Jahre 1855 zu Makassar. Auch der Prinz Lasasso darf nicht in das Land seiner Väter zurückkehren. aber kein Javane der nach Makassar kommt, soll es versäumen ihm seine Huldigung darzubringen.

Gegen 18 Uhr dampsten wir gen Norden ab. Allmählich entschwand Makassar, weiterhin auch die Kuste von Celebes unseren Blicken und wir gelangten in den Spermonde-Archipel, eine Gruppe zahlreiches Koralleneilande, deren Bewohner meist dem Fischergewerbe obliegen. Fast jedes dieser Eilande ist mit Cocospalmen und Brotfruchtbäumen bedeckt, während der Strand mit kleinen Hütten bekränzt ist. Seiner vielen Riffe wegen ist dieser Theil der "Mangkassar-Strasse" besonders gefürchtet - ein wahrer Friedhof der Schiffe. Die niederländisch-indische Dampfschifffahrtgesellschaft weiss auch ein Lied davon zu singen. In den Mittagsstunden näherten wir uns wieder der Küste, die Berge von Tanette tauchten im Hintergrunde auf und um 1 3 Uhr fiel der Anker in der Nahe der Mundung des Pantjana- oder Tanette-Flusses. Es galt der Lehnsfürstin von Tanette, Namens We-tanri-Ollé, welche sich augenblicklich in dem Orte Pantjana aufhielt, einen Besuch abzustatten. Bei dem Erscheinen des Dampfers war sofort am Ufer die niederländische Flagge gehisst worden und bald tauchte ein Abgesandter der "Königin" zur Begrussung auf. Dieser Hofschranze war mit einem grunseidenen Jäckchen, welches mit goldenen Knöpfen versehen war, bekleidet. Um die Huften und Beine schlug sich ein rother Sarong, unter welchem sich zugleich das Kris verbarg. Sein Haupt bedeckte ein kleines aus Pferdehaar verfertigtes Kappchen (Songko). Eine Stunde später wurden wir in einer Schaluppe an das Land besördert, wo einige Edelleute zum Empfange bereit standen. Hierauf schritten wir die Ehrencompagnie ab, zur einen Halfte aus 5 uniformirten und mit Feuersteingewehren bewaffneten Leuten bestehend, denen sich ein Trommler, sowie ein Hornist anschlossen. Zur anderen Hälfte bestand sie aus Lanzenträgern, welche sich vor dem Eingange der Wohnung in Reih und Glied aufgestellt hatten. Das Haus ruht, wie überall auf Celebes auf Pfahlen und galt es zunächst eine in die Wohnraume führende schiefe Ebene zu erklimmen, welchen zweifelhaften Vorzug ausschliesslich fürstliche Wohnungen geniessen. Der mit Stiefeln bewaffnete Europäer hat trotz des Geländers Muhe das glatte, schräge stehende Bambusgeflecht zu erklimmen. Nachdem man oben angelangt und eine Art Vorgemach durchschritten hat, kommt man in den eigentlichen Empfangsraum, welcher aber mehr einer mit Tuchern behangenen Bretterbude gleicht. Inmitten des Gemaches stand ein langer, mit einigen Metern gewöhnlichen Shirting bedeckter Tisch, an dessen einem Ende die Furstin mit ihrem ganzen Schmuck angethan, prangte. Bekleidet mit einem dunkelblauen seidenen Jäckchen, schlang sich über die Schulter eine schwere, goldene Kette, welche auf der linken Brust mit

2 grossen. ovalen, goldenen Medaillen schloss. Dieselben waren von der Ost-Indischen Compagnie gestiftet worden und trugen auf der Vorderseite das Wappen derselben. Auf der Ruckseite waren beide mit Inschriften versehen, von denen die eine, in hollandischer Sprache verfasste, besagte, dass die Medaille dem Prinzen Lathans Virassu im Jahre 1751 bei Gelegenheit seiner Beschneidung verehrt worden sei. Die in malavischer Sprache abgefasste Inschrift der anderen Medaille lautete dahin, dass der Fürst Jusupu Paharudin Matinrowé-rimussuna dieselbe im Jahre 1743 wegen seiner Hülfe bei dem Kriege gegen Surakarta erhalten habe. Noch eine dritte Munze schmuckte die 54 Lenze zählende, aber viel älter aussehende Fürstin. Dieselbe ward gleichfalls an einer goldenen Kette und zwar am Halse getragen. Auf der Vorderseite zeigte das Gepräge das niederlandische Wappen und auf der Rückseite stand zu lesen, dass die Indische Regierung ihr dieselbe in Anerkennung ihrer bei der topographischen Aufnahme des Landes geleisteten Dienste im Jahre 1862 verliehen habe. Diese Schmuckgegenstände gehören mit zu den Reichskleinodien und gehen stets auf den Inhaber der fürstlichen Gewalt über oder richtiger gesagt, in den Augen des Volkes ist der glückliche Besitzer als Herrscher anzusehen.

Die gute Dame reichte Jedem von uns die Hand, worauf wir auf den bereit stehenden Stühlen Platz nahmen, während das Gefolge, darunter auch die beiden Minister, hier Pabitjara's genannt, auf dem Boden niederhockte. Die Unterhaltung bestand grösstentheils in Schweigen; ausschliesslich der buginesischen Sprache machtig konnte sich die Fürstin direkt nur mit den beiden Herren Brugman unterhalten. Ihre Hauptbeschaftigung bestand in dem Kauen von Siri und wurden die aufgerollten, zuvor innen mit gelöschtem Kalk bestrichenen Blätter von einer Sklavin dargereicht. War der Kalkzusatz ein wenig reichlich ausgefallen, so wurde derselbe herausgequetscht und die feuchte Masse höchst eigenhändig an den Stuhlbeinen abgewischt. Der einzige Sohn der Furstin hatte mit an dem Tische Platz genommen. Ich möchte demselben wohl wünschen, dass er der Thronerbe wurde, was durchaus noch nicht sicher ist. In seiner Jugend hatte er ein wustes Leben gefuhrt, so dass die Regierung ihn auf das Ersuchen seiner Mama während einiger Jahre nach Java verbannt hatte und dieser Aufenthalt scheint einen gunstigen Einflus ausgeübt zu haben. Die Lieblinge der Fürstin sind nämlich die drei Töchter und, unter diesen besonders die alteste, die, obwohl sie das kanonische Alter bereits überschritten, doch noch keinen Mann gefunden hatte. Nicht etwa dass es an Bewerbern fehlte! Vergeblich aber schaut man nach einem Fürstensohne

aus, der den Anforderungen seiner zukunftigen Schwiegermutter genugen könnte, denn einen Prinzen auf Celebes zu finden, welcher der Regierung wohlgesinnt und weder dem Laster des Opiumrauchens, noch dem des Spieles ergeben ist, erscheint wenig denkbar. Vergeblich warteten wir auf das Erscheinen der Töchter, die bereits seit Stunden mit der Toilette beschäftigt waren. Es verlangte uns aus der schwülen Atmosphäre hinaus ins Freie, zumal uns die in Gläsern dargereichte, bereits lauwarme Cocosmilch nichts weniger als erfrischte, sondern in der Magengegend ein Gefuhl hervorrief, wie dies etwa abgestandenes bayrisches Bier thut, zumal wenn dasselbe aus einer Kaffetasse getrunken wird. Dem der Fürstin verdolmetschten Verlangen wurde denn auch Folge gegeben und so zogen wir, von einem Schwarm Menschen gefolgt, längs des linken Ufers des Stromes, waren aber in Folge des Eintrittes der Dunkelheit bald wieder genöthigt umzukehren. Der flache Kustensaum ist in diesem Theil von Tanette sehr schmal, in geringer Entfernung erhebt sich bereits das wenig hohe Gebirge. Als wir den Palast wieder betraten, waren die 3 Prinzessinnen endlich auf der Bildfläche erschienen. Beladen mit einer unsinnigen Menge von Gold- und Silbergeschmeide, verbreiteten sie zugleich nach allen Seiten durchdringende Wohlgerüche. Auch zierte sie kein Rosenmund, denn Zahne und Lippen waren in Folge des Sirikauens bereits arg entstellt. Aus einem kostbaren silbernen Service - ein Geschenk der Indischen Regierung aus dem Jahre 1872 - wurde noch Thee geschenkt, dazu Kuchen (Kwé-kwé) und candirte Früchte angeboten und dann brachen wir auf. Die Fürstin hatte gehofft uns noch zum Essen bei sich zu sehen, wir hatten aber alle Ursache das an Bord des "Sperwer" unserer wartende Mahl vorzuziehen. Frau Weber erhielt als Andenken an diesen Besuch ein zierliches Körbchen und alsdann wurden wie mit denselben Ehrenbezeugungen, wie bei unserer Ankunft entlassen.

Am folgenden Morgen setzte der Dampser seine Fahrt fort, nachdem zuvor der Prinz von Tanette mit seinem Gesolge an Bord gekommen war, um sich uns anzuschliessen. Nach wenigen Stunden war die Bai von Pare Pare erreicht, welche von niedrigen Usern umsäumt, sich allmählich trichtersörmig verengt, um sich dann aus Neue zu der Bai von Supa (Suppa) zu erweitern. An der schmalsten Stelle und zwar am östlichen Gestade jener Bai liegt Pare Pare, der gemeinsame Name sur einen Complex von Ortschasten (Udjonge, Sabange, Pauwe, Labukang). Das zu Pare Pare gehörende Gebiet ist klein, aber von nicht unerheblicher Wichtigkeit, da es die Eingangspforte zu der nach dem Innern des Landes suhrenden Strasse darstellt. Seit dem 23ten September 1854 ist

dasselbe dem niederländischen Grundbesitz einverleibt, aber leider nicht unter direkte Verwaltung gestellt, sondern dem Radja von Sidenreng als Lehen verlichen worden, so dass die von allen selbststandigen Fürsten auf Celebes geübte Misswirthschaft uppig gedeiht. Der Handel ist nicht unbedeutend, liegt aber meist in Händen von Arabern. Dem regelmässig anlaufenden Postdampfer bietet sich daher auch wenig Gelegenheit Ladung einzunehmen.

Gegen 11 Uhr Vormittags waren wir angelangt, doch dauerte es etwa 2 Stunden, ehe der Schout mit dem Sabannara (Hafenmeister) zur Begrtssung erschien. Nachdem dieselben den Auftrag betreffs der Beschaffung von Unterkunstsräumen entgegen genommen hatten, zogen sie von dannen, um nach Verlauf einiger Stunden mit der Nachricht zurückzukehren, dass die Wohnungen bereit ständen. Der Assistent-Resident Brugman wurde mit seinem Gefolge bei der Prinzessin Danggo Patta Bunga einquartiert, während man der Familie Weber und mir den Vorderraum eines anderen Hauses, ungefähr unserer "guten Stube" entsprechend, anwies. Auch im weiteren Verlaufe der Reise erhielten wir stets ein nach der Strasse m gelegenes Zimmer. Wir liessen nunmehr unser Gepäck in das in unmittelbarer Nahe des Strandes gelegene Quartier schaffen, wohin wir ms gleichfalls zur Inaugenscheinnahme desselben begaben. Vermittelst einer treppenartigen Leiter gelangt man durch die Hauptpforte in einen Gang (Tamping), welcher so lang wie das Gebäude selbst ist. Zur Linken liegen alsdann die durch Bambuswände von einander abgetheilten Wohnraume, so dass eine Reihe von Familien in einem Hause untergebracht werden kann. Der Tamping dient nicht allein als Gang, sondern auch als Knde, als Abort u. s. w Ueberhaupt lässt man jeglichen Unrath durch die breiten Spalten des Fussbodens nach unten gleiten, wo er so lange liegen bleibt, bis die Wasserfluthen der Regenzeit sich seiner erbarmen und ihn hinver schwemmen. Ein solcher Pfuhl unter den Häusern wird Tjamma genant Sämmtliche buginesischen Kampongs zeichnen sich deshalb durch eine be deutende Schmutzfulle aus, doch kann man nicht behaupten, dass dieselbt den Gesundsheitszustand der Bevölkerung in ungunstiger Weise beeinflust

Unsere Ankunft hatte eine ungeheure Aufregung verursacht. Auf Schritt und Tritt wurden wir von einem Schwarme grosser und kleiner Kinder verfolgt, in der Wohnung kauerten ununterbrochen 30—40 Merschen auf dem Tamping nieder, welche uns in gleicher Weise anstaunten wie dies mit den in verschiedenen "Zoologischen Garten" Europais vorgeführten Singalesen, Grönlandern und anderen Vertretern fremder Völkerschaften geschieht. Es mag jedoch hervorgehoben werden, das

diese Buginesen sich bei der Schaustellung weitaus gesitteter betrugen, als in jenem Falle das gebildete europäische Publikum. Die Prinzessin hatte die Gute gehabt, unseren Wohnraum mit einigen bunten Kattunvorhängen austapeziren zu lassen und uns auch einen altersschwachen Tisch, sowie einen eben solchen Stuhl zur Verfügung zu stellen. Wir machten uns alsbald auf den Weg dieser Dame unsere Aufwartung zu machen, wurden zunächst aber nur von Herrn Brugman empfangen. Nachdem wir eine Weile gewartet hatten, hörten wir plötzlich ein Krachen hinter der Bettstelle und gleich darauf zwängte sich unter allgemeiner Heiterkeit zwischen dieser und der Wand eine weibliche Gestalt hindurch. Hinterher folgten einige Dienerinnen, die mit ganz durchscheinenden Mousselinejackchen, welche mehr enthüllen als verhüllen, bekleidet waren. Die Prinzessin ist eine Frau mit nicht unangenehmen Gesichtszugen, welche einen unverkennbar energischen Ausdruck besitzen. Sie ist die zeschiedene Gattin des Aru Matowa von Wadjo und die Schwester des Radja von Sidenreng. Ob der letztere sie hierher verpflanzt hat, um das Gebiet von Pare Pare zu verwalten, oder ob er sie überhaupt hat los sein wollen, wurde nicht verrathen. Die Unterhaltung war eine lebhaftere, als bei der Fürstin von Tanette, doch musste auch hier jedes Wort verdolmetscht werden. Nach Erledigung dieses Besuches begaben wir uns an Bord des "Sperwer" zuruck, um unser Abendessen einzunehmen und siedelten darauf erst definitiv in unsere Wohnung über. Wir waren in dem Glauben uns nunmehr der ersehnten Nachtruhe hingeben zu können, hatten damit aber die Rechnung ohne die Prinzessin genacht. Von weiblicher Neugier getrieben erkletterte diese in später Abendstunde die zu unserer Behausung führende schwankende Treppe, ım unsere Einrichtung zu beschauen. Alle Gegenstande wurden beastet und durch Blicke die Bedeutung derselben zu erfragen gesucht. Besonders Interesse erregten aber die eisernen emaillirten Tassen, deren Inzerbrechlichkeit durch das Hinwerfen auf den Boden demonstrirt wurde. Insere Aufmerksamkeit lenkte sich dagegen auf ein reichlich 10 cm. anges, bogenförmig gekrummtes und reich verziertes Nagelfutteral, welches lie Prinzessin auf dem Daumen der linken Hand trug. Es zeigte sich, lass dasselbe zum Schutze eines riesigen, mehrere Centimeter langen Nagels diente. Der Besitz eines solchen Nagels ist nur vornehmen Frauen estattet, und verdammt thatsächlich die Tragerin zur Enthaltung von eglicher Arbeit - weiter hat es aber auch keinen Zweck. - Die gerunschte Ruhe ward endlich gefunden und erst am folgenden Moren gewahrte ich die Spuren des nächtlichen Besuches höchst un-

holder Gäste, die ihre Angriffe in jedem Kampong erneuern sollten. In der Frühe des 8ten Octobers trat der "Sperwer" die Heimfahrt nach Makassar an. Wir selbst waren genöthigt noch einige Tage in Påre Påre zu bleiben, bis der Radja von Sidenreng Lastträger und Pferde zum Weitermarsch gesandt haben wurde, und so benutzten wir die zur Verfugung stehende Zeit zu Ausstugen in die Umgebung. Durch die Fensteröffnungen unserer Hauses genossen wir einen sehr hübschen Ausblick auf das Ende der Bai von Pare Pare bis zum gegenüberliegenden hugeligen User, welcher sich noch über einen Theil der Bai von Supar mit den darin befindlichen Inseln ausdehnte (siehe Taf. II Fig. 1). Nach einigen Unterhandlungen ward ein Nachen gewonnen, der uns über die spiegelglatte See zunächst nach der Insel Karama 1) brachte. Ich landete an dem flachen Südstrande, an welchem sich ein kleiner, dürftiger Kampong befindet und bestieg von dort aus den bewaldeten etwa 30 m. hohen Hugel, welcher aus neogenem Kalkstein besteht, dessen Schichten auf der Höhe ausstreichen. An der Ostseite fällt der Hügel schroff ins Meer ab. Als ich an das Sudufer zurückkehrte, war inzwischen Ebbe eingetreten, das Wasser war so untief, das das Boot nur watend erreicht werden konnte, aber gerade dieser niedrige Wasserstand gestattete einen Einblick in den Schichtenbau dieses Gebietes. Vom Festlande aus streichen die Schichten bis weit in die Supa-Bai hinein, welche sich alsdann in die Insel Karama fortsetzen. In Zwischenraumen ragen die Schichtesköpfe von vier Kalksteinbanken über dem Meeresspiegel hervor, mit einem Streichen von N 20° W. und einem Einfallen von 6° gegen W. Am jenseitigen Ufer angelangt, gewahrt man, dass das Zwischenmittel zwischen den Kalksteinbanken aus einem murben, thonigen Sandstein besteht, der seiner geringeren Widerstandsfähigkeit wegen vom Meerwasser herausgenagt worden ist. Påre Påre gegenüber stellt das Ufer einen Steilabstur dar. Im Uebrigen ist das ganze Gebiet stark bewaldet. Wir fuhren noch zu den Klippen, Batu Tété genannt, welche nur zur Ebbezeit über den Wasserspiegel hervorragen und aus demselben Kalkstein bestehen, wie er auf P. Karama u. s. w. ansteht, doch sind hier die Felsen von zahlreichen recenten Lithothamnien überkrustet. Die Bai von Pare Pare schneidet scharf zwei verschiedene Ablagerungen von einander ab und zwar treten in dem ihr benachbarten nördlichen Gebiete ausschliesslich neogene Kalksteine und Sandsteine auf, während südlich von ihr nur

¹⁾ P. Kamarrang der Seekarten.

Andesit-Tuffe und Conglomerate vorkommen. Wir sollten diese Verhältnisse in den nächsten Tagen kennen lernen.

Der folgende Morgen führte uns an einen Fluss, welcher eine Meile östlich von Pare Pare, in der Nähe des Kampongs Sareminjae vorbeifliesst und uns als Salo Brissi bezeichnet wurde 1). Derselbe mündet unter vielen Krümmungen schliesslich bei dem Kampong Sumpang Minanga sudlich von Pare Pare in das Meer und zwar hier unter dem Namen Badjo Kiki. Die Gewohnheit einen und denselben Fluss in seinem Laufe mit verschiedenen Namen zu belegen, giebt oft zu Irrthumern Anlass. Unser Begleiter war mit einer langen Lanze bewaffnet, da er behauptete, es gabe in der Umgegend Räuber, es war jedoch wohl mehr die Macht der Gewohnheit, die ihn zum Mitnehmen des Spiesses veranlasste, ohne welchen man überhaupt selten einem Menschen auf offenem Felde begegnet. Die Spitze war aus einem vorzuglichen Stahl verfertigt und stammt aus Luwu. Der Weg führte uns zunächst an dem neben unserer Wohnung liegenden Packhause des Fürsten von Sidenreng vorbei, in welchem der Schweiss des Volkes d. h. der geerntete Reis bis zu seiner Verschiffung aufbewahrt wird, nebenbei bemerkt auch der einzige massive Bau des ganzen Ortes. Hierauf ins Freie gelangend, kommen wir an Salzgärten vorbei und stossen nach wenigen Minuten auf einen aus Andesit-Conglomerat bestehenden Hugel, dessen Oberfläche mit Geröllen übersäet ist. Weiter geht es durch Gemüsegärten, bis wir abermals auf einen Hugel stossen, und von jetzt ab bleibt das Terrain langam ansteigend stets wellig hugelig, hier und da an den Abhängen einen lichtgrauen Andesittuff zu Tage treten lassend. Die Gegend macht den Eindruck grosser Oede, zuweilen einigermaassen an Eifellandschaften erinnernd. Vorherrschend ist die Bekleidung des Bodens mit durrem Grase, dazu gesellt sich ein recht mangelhafter Baumwuchs Nur dann und wann tritt zur Rechten ein kleines Gehölz auf, in welchem zahlreiche Kakadu's ihr krächzendes Geschrei ertönen lassen und auch ein Affe erscheint ab und zu, der zu einer allgemeinen Jagd den erwunschten Anlass bietet. In fast ununterbrochen östlicher Richtung uns fortbewegend, durchschreiten wir zweimal das trockene Bett versiegter Bache, welche mit zahlreichen Andesitgeröllen erfullt sind, und kommen auch an den beiden aus sehr verfallenen Hütten bestehenden Kampongs Djompi und Sareminjae vorbei, bis wir endlich nach anderhalbstundigem Marsche an dem

¹⁾ Bensbach nennt ihn Salo Karadja oder Marässing (P. B. van Staden ten Brink, Zaid-Celebes, Utrecht 1884, Bijlagen, p. 95).

Salo Brissi anlangen. Trotzdem wir uns dem Ende des Ostmonsuns näherten, war in demselben noch ein starker, wenn auch ziemlich eingeengter Strom vorhanden. Der trocken gelegte Theil des Bettes stellte eine wahre Musterkarte der verschiedensten Andesitvarietäten dar, welche in der Gestalt grosser Blöcke bis zu kleineren Rollstücken herabsinkend eine ausgedehnte Ablagerung darstellten. Die Breite des hier in nordstelicher Richtung strömenden Flusses beträgt etwa 20-25 m., das gegenüberliegende linke Ufer fällt steil ab und zeigt nur mit Sandablagerungen wechselnde Geröllbänke. An diesem Punkte führt nach Ueberschreitung des Flusses die grosse Heerstrasse weiter nach Sidenreng. Etwa 50 Schritte weiter sudwarts sind, gleichfalls am linken Ufer, oberhalb des Wasserspiegels Banke von Andesittuff in schwebender Lage aufgeschlossen. Darüber lagern wieder Tuffe mit zahlreichen Andesitblöcken, nach oben zu in ein grobes Conglomerat übergehend. Weiter sudwärts macht der Salo Brissi eine starke Biegung und nunmehr treten am rechten Ufer die Tuffschichten zu Tage aus, darüber ist Alles dicht bewaldet. In die Sudostecke jener Stelle munden zwei kleine Bache ein, von denen der eine sich vorher über eine Bank harten Andesit-Conglomerats ergiessend, einen kleinen Wasserfall bildet. In der Mittagstunde kehrten wir wieder in unsere Behausung zurück.

Am nachsten Tage (10 Oct.) bot sich die Gelegenheit einen Theil des unteren Laufes des Badjo Kiki, wo ahnliche Verhaltnisse obwalten, zu erforschen. Wir verfolgten den Weg hinter unserem Hause, welcher an dem Brunnen vorbeiführt, in sudostlicher Richtung durch Stoppelselder von Reis, sowie Bohnenanpflanzungen und stiessen bereits nach einigen Minuten auf eine mit Andesitgeröllen bedeckte kleine Kuppe. Noch immer in der Ebene bleibend, wenden wir uns am Fusse derselben nach Osten, um alsdann längs einer Hugelkette weiterschreitend eine sudliche Richtung einzuschlagen. Da sich herausstellte, dass unser Führer des We ges ganzlich unkundig war, mussten wir aufs Gerathewohl unser Ziel 21 erreichen suchen. Bald war ein Hugel erklommen, dessen Gipfel aus berizontal liegenden, geschichteten lichtgrauen Tuffen bestand. Jeglicher Pfad hatte aufgehört. Durch dichtes Gestrupp und Wald uns hindurch windend, dabei über Gesteinsblöcke kletternd, ging es bergan, bergab, bis wir schliesslich in einen Thalkessel gelangten, in dessen Grunde ein trockenes Bachbett angetroffen wurde. Dem Laufe desselben folgend, erreichten wir endlich die allseitig bewaldeten Ufer des Badjo Kiki. In starken Krummungen windet sich der Fluss durch Tuff- und Conglomeratbanke hindurch, die augenblicklich vorhandenen sehr geringen Wassermassen schleichen nur langsam dem unfernen Meere zu. Die Tuffschichten zeigen bei geringem Neigungswinkel ein Einfallen gegen West und streichen quer durch den Fluss, so dass sie im Bette stellenweise Riegel bilden, hinter welchen sich kleine Pfützen ansammeln. Herausgewaschene Andesitgerölle sind zahlreich vorhanden. Wir wandten uns nunmehr stromaufwärts und gelangten alsbald an einen Steilabsturz, an welchem schwebende Tuffschichten, mit Conglomeratbanken regelmässig wechsellagernd, in ausgezeichneter Weise aufgeschlossen sind. Das theilweise so von schroffen Felsen begrenzte Thal, bietet auch garnicht zu verachtende landschaftliche Schönheiten dar, deren Eindruck durch die starke Bewaldung noch erhöht wird. Nach dreimaliger Ueberschreitung des Badjo Kiki und hierauf durch Alang-Alangfelder wandernd, wurde der hinter Pare-Pare in N-S streichende Hugelrucken erreicht. Im Vordergrunde gewahrten wir zu unseren Füssen die wohlerhaltenen Fürstengräber, unmittelbar dahinter die Wohnstätten der Lebenden und daruber hinaus die Buchten von Pare-Pare und Supa mit ihren jenseitigen Ufern. An diesem Aussichtspunkte hauchte auch ein von Weber erkaufter, aber von den Eingeborenen arg geschundener grauer Affe seinen letzten Seufzer aus. - Nach schnellem Abstiege war bald unser Heim erreicht.

Wahrend der Vormittagsstunden hatte Frau Prof. Weber unsere Geschenke, wie dies landesublich ist, der Prinzessin überreichen lassen. Dieselben bestanden aus einem rothen mit Gold durchwirkten, seidenen Sarong, einer grossen Waschkumme mit Kanne und einer eisernen, emaillirten Tasse. Als Gegengabe wurde uns 1 Pikul Reis, 2 Huhner, 1 Ente und einige Bananen verehrt. Nachmittags folgten wir der Einladung eines Arabers in dessen Wohnung zur Feier irgend eines häuslichen Festes. Ein derartiger Besuch von Europäern wird stets als eine grosse Ehre angesehen und hat für den Empfänger ausserdem noch den Vortheil, dass er damit in der Achtung der Eingeborenen um einige Grade steigt. Erwartungsvoll sah denn auch eine Menge Volks unserer Ankunft entgegen. Als wir endlich anlangten, wurden wir oben am Eingange von dem Gastgeber sammt seinen mannlichen Familiengliedern empfangen und in ein langes, niedriges und ziemlich schmales Gemach geleitet. Den grössten Theil dieses Raumes fullte ein langer Tisch aus; die von demselben getragene susse Last war den Blicken jedoch durch ein übergedecktes Stück Baumwollenzeug entzogen. Kurz nach uns traf die Prinzessin ein, welche mit Frau Weber das obere Ende der Tafel einnahm, wir Uebrigen schlossen uns zu beiden Seiten an. Nunmehr wurde der Schleier hinweggezogen. worauf sich unseren Blicken die Perspektive auf das aus Kuchenwerk und kandirten Früchten bestehende Mahl eröffnete, welches auf nicht weniger als 62 Schusseln und Teller möglichst symmetrisch vertheilt war. Auf das Zureden des freundlich grinsenden Wirthes wurde den Gaben nach besten Kräften zugesprochen. Manches konnte als sehr schmackhaft gelten, so die kandirten Ananas, Papaja und Ingwer, weniger mundeten dagegen die verschiedenartigen Kuchen, welche unter dem Namen Kwé-Kwé sich bei den Eingeborenen einer grossen Beliebtheit erfreuen. Arabischen Ursprungs war eine Art Pfannkuchen, Hobbes genannt. Das uns nachgeströmte Volk, welches lautlos auf dem Fussboden niederkauerte, verfolgte mit neugierigen Blicken unser Thun und Treiben. Ab und zu ward der Menge eine wohlgefüllte Schüssel dargereicht, deren Inhalt nach wenigen Sekunden spurlos verschwand. Nachdem noch Thee, Kaffe und Cigarren gereicht worden waren, wurde die Sitzung gegen 7 Uhr aufgehoben und wir waren herzlich froh nach dieser Leistung der schwülen Atmosphäre entrinnen zu können. Inzwischen war die Fluth eingetreten, welche sich zwischen einzelne Theile der Ortschaft trennend einschiebt, so dass wir uns mittelst kleiner Boote nach unserer Wohnung übersetzen lassen mussten. Es war die letzte Nacht, welche in Pare-Pare zugebracht werden sollte und galt es somit den Rest des Abends dazu zu verwenden unsere Habseligkeiten zu packen.

Der Morgen des 11ten October beschien ein buntes Menschengewimmel. Es war Markttag (Passer) und von allen Seiten zu Wasser und zu Lande, zu Pferd und zu Fuss, strömte die Bevölkerung aus den umliegenden Ortschaften herbei, um ihre ebenso geringen wie geringwerthigen Erzeugnisse für einige Hühner-Deute (haantjes-duiten, duit ajam 1)) an den

¹⁾ Dieselben haben ihren Namen dem auf dem Avers dargestellten Hahn zu danken. Unter der gleichen Bezeichnung figuriren aber auch die von der früheren englischen Ost-Indischen Compagnie im Jahre 1804 für die Insel Samatra mit ihrem Wappen geschlagenen Deute. Andere tragen wiederum die malayische Außehrift "Buginesische Lande" Eine ausführliche Beschreibung dieser Münzen findet man bei H. C. Millies, (i)e munten der Engelschen voor den Oost-Indischen Archipel, Amsterdam 1852), sowie bei E. Netscher und J. A. van der Chijs, (De munten van Nederlandsch-Indië, Batavia 1863). Es mag noch hinzugefügt werden, dass ausser den in den genannten Werken aufgeführten Deuten, uns eine nicht geringe Anzahl durch die Hände ging, welche die Außehrift tragen plsland of Sultana", zugleich mit einem augenscheinlich demjenigen der englischen Compagnie nachgebildeten Wappen und den Jahreszahlen 1804 resp. 1835 versehen. Einer sehr unwahrscheinlich klingenden Annahme von J. S. van Coevorden zufolge (Tijdschr. voor Ind. Taal-, Land- en Volk., VII, 1858, p. 126), soll mit Sultana die Insel Labuan gemeint sein, der man diesen Namen habe verleiben

Mann zu bringen und um Neuigkeiten einzuheimsen. Die vom Radja von Sidenreng gestellten Kulis und Pferde waren am Abend zuvor angelangt und harrten nunmehr unseres Gepäckes, sowie unserer eigener Person. Bereits in der Frühe waren die Lagerstätten aufgerollt worden, aber noch manche Stunde verrann, ehe Alles zum Abmarsche bereit stand. Unter der Aussicht des Schout, sowie des Schabandar erhielt jeder Kuli das ihm zugedachte Quantum aufgepackt und nachdem gegen 19 Uhr endlich das letzte Lastpferd beladen worden war, konnten auch wir unsere Rosse besteigen. Es war ein malerisches und farbenreiches Bild, welches die aus etwa 100 Mann zu Fuss und 50 Pferden bestehende, regellos dahinschreitende Kolonne darbot. Neben dem, lediglich mit dem Kopftuche und dem um die Lende geschürzten Sarong bekleideten Kuli, trugen andere Buginesen dazu noch den schärpenartig über die Schulter geworfenen Slendang und als Waffe die unvermeidliche Lanze. Wieder Andere sassen hoch zu Pferde und nahmen häufig Veranlassung ihre Geschicklichkeit als Reiter zu zeigen. Als Chef der ganzen Truppe fungirte der Capitano Sanré, Generalissimus des Heeres von Sidenreng, ein alter Herr, welcher seines Amtes mit Wurde waltete. Wir legten anfangs und zwar bis zum Salo Brissi denselben Weg zurück, welchen Weber und ich bereits zwei Tage zuvor gegangen waren. Sodann wurde der Fluss durchschritten und das steile jenseitige User erklommen. Nachdem die Höhe erreicht worden war und wir auf derselben einige Zeit weiter geritten waren, sahen wir zur Linken eine ausserordentlich steile und tiefe Schlucht durch welche der erwähnte Fluss sich Bahn gebrochen hat. Die lothrechten, aus lichtgrauen Tuffschichten bestehenden Wände, waren jeglicher Vegetation bar. Hügel auf Hügel wurde überschritten. Die Gegend bot ein Bild erschreckender Oede, keine menschliche Wohnung war im Umkreise zu sehen, den Boden bedeckte durftiges Gras, zwischen welchem dann

wollen. Labuan kam aber erst 1846 in englischen Besitz und war vorher unbewohnt. Alle diese Münzen sind ursprünglich von der malayischen Halbinsel eingeführt worden. Die Werthverhältnisse sind die folgenden:

⁸ duīt ajam = 1 duīt di Makassar. 120 duit di Makassar = 1 Gulden (ropia).

Man erhält demgemäss für einen Reichsthaler (ringgit) die stattliche Anzahl von 900 duït ajam und hat es daher sehr billig mit klingender Münze zu klimpern. Unter duït di Makassar versteht der Buginese die gewöhnlichen alten Deute, welche der Münzreform von 1 Mai 1854 zufolge längst hätten eingezogen werden sollen, aber noch immer auf Celebes die fast ausschliesslich gangbare Scheidemünze darstellen. Geldwechsler gebören denn auch mit zu den typischen Strassenfiguren von Makassar. Der kleine Mann hat, wie immer bei solchen Gelegenheiten, den Schaden zu tragen.

und wann die Tuffschichten hervorragten. Auf den Abhängen lagen zahlreiche Andesitblöcke umher, unter denen einzelne die Grösse eines Kubikmeters erreichten; sporadisch tauchte auch ab und zu ein Baum auf. Nachdem ein in ostwestlicher Richtung streichender Höhenrücken überschritten war, wurde der Fluss abermals passirt und langten wir um 12 Uhr an dem Kampong Pabarassang an, wo gerastet wurde. Ein bescheidener, aber völlig ausreichender Pasanggrahan bietet Unterkunft, während ein in Nähe rieselnder Bach das nöthige Wasser zum Kochen spendet. Pabarassang liegt in etwa 170 m. Höhe. Nach zweistundiger Ruhepause wurde der Marsch fortgesetzt. Der Weg wendet sich während kurzer Zeit gen Norden, um sich alsbald wieder der östlichen Hauptrichtung zuzuwenden, dabei bergan, dann wieder bergab steigend. Noch dreimal wird der Fluss überschritten. Die Bergrücken haben sämmtlich gerundete Formen, der Gesteinscharakter bleibt im Allgemeinen der gleiche. Wo Quellengange vorhanden sind, entwickelt sich wohl ein kleines Gehölz, welches dem Auge frische grune Farben darbietet und dort wo die Thalsohlen sich verbreitern, gewahrt man auch die Spuren einer Reiskultur; von menschlichen Behausungen ist dagegen sehr selten etwas zu verspüren. Kurz nach 3 Uhr haben wir endlich in einer Höhe von 265 m. den Berg Paria erklommen, welcher die Wasserscheide darstellt. Von der versprochenen schönen Aussicht ward uns nur ein schwacher Abglanz zu Theil, aber dieser war hinreichend, um die begeisterten Worte, welche Frau Ida Pfeiffer diesem Punkte widmet, für völlig zutreffend zu erachten 1). Zu unseren Füssen stürzte das Gebirge in treppenartigen Absatzen ab und verlor sich alsdann in die weite, weite Ebene, in welcher die beiden Seen von Sidenreng und Tempe liegen. Nur von dem erstgenannten sahen wir noch einen Theil, alles weiter nach O. und SO. Liegende verhullte ein truber Schleier, wie ihn das Ende der Trockenzeit mit sich bringt. Hier und da ragen aus der Ebene kleine isolirt stehende Bergkuppen hervor. Zur Linken setzt sich der Bergrücken in nordöstlicher Richtung weiter fort, schroffe, zackige Felsabsturze nach der Ebene zu bildend. Langsam steigen wir jetzt bergab und gelangen nach einer halben Stunde in den Kampong Tjaila (spr. Tjela) 175 m., wo ein Warong zu einer kurzen Rast einladet. Dann geht es weiter abwärts. Ausgedehnte Bananengärten treten auf, ab und zu erscheinen Lontarpalmen und endlich gelangen wir an unermesslichen, augenblicklich in Stoppeln stehenden Reisselden vorbei. Zur Linken taucht der erste der isolirt sich er-

¹⁾ Ida Pfeiffer, Meine zweite Weltreise, II, Wien 1856, p. 243.

hebenden Kuppen auf, es ist der Bulu (Berg) Baula (wer denkt dabei nicht an den ungleich gewaltigeren islandischen Berg gleichen Namens?). Alsdann gelangen wir in die Nähe bewohnter Orte, die zwischen Baumgruppen versteckt liegen; hinter Zaunen liegen grosse Haufen von Reis aufgespeichert. Auf meine Bemerkung, dass hier doch kein Mangel an diesem unentbehrlichen Nahrungsmittel herrsche, erwiederte einer der eingeborenen Begleiter: "Nein, aber diesen Haufen gehören alle dem Fürsten"! Endlich ist der volkreiche Kampong Amparita erreicht, wo eine riesige Menschenmasse unserer harrt. Ohne Aufenthalt geht es weiter, die Sonne geht bereits zur Neige und das Ziel ist noch 1200 m. entfernt. Unmittelbar hinter dem Dorfe muss ein tiefer, morastiger Bach durchwatet werden, und vom jenseitigen Ufer an dienen schmale Raine zwischen den Feldern, welche zugleich die für die Irrigation derselben nothwendigen Damme darstellen, als Pfade. Noch einmal muss ein, diesmal trockenes Bachbett durchschritten werden. In dasselbe sind Löcher eingegraben und Frauen damit beschaftigt, die sparlich heraussickernden Wassermengen in irdene Töpse zu schöpsen. Gleich darauf befinden uns am Eingange des Kampong Teteadji, in welchen wir bei einbrechender Dunkelheit unseren Einzug halten. Der ausgedehnte Marktplatz ist roth von Menschen, denn alle Einwohner sind mit gleichförmig rothen Sarongs bekleidet. Wir steigen in dem vom Fürsten uns angewiesenen Hause ab und erhalten ein wesentlich grösseres und besseres Gemach, als dies in Påre Påre der Fall gewesen war. Im gleichem Verhaltniss hatte sich aber auch die Zahl der neugierigen resp. wissbegierigen Zuschauer vermehrt. Wir waren so unvorsichtig gewesen, das an und für sich sehr freundliche Anerbieten des Radja für unser Abendessen Sorge zu tragen anzunehmen. Nach dem anstrengenden Tagesmarsche machte der Magen seine Rechte in sehr entschiedener Weise geltend, aber erst um 9 Uhr ward der erste Gang des Menus, bestehend aus Kwé-Kwé und gebratenen Bananen, gebracht. Nach einer halben Stunde schien der zweite und letzte Streich: Reis, allerlei Fragmente von dem beruhmten Vogel Ajam, Eier, sowie verschiedene Gerichte unbekannter Herkunft. Uns auf Reis und Eier beschränkend, vertrauten wir das Uebrige der Dienerschaft an, die sich auch Alles wohl schmecken liess.

Der Vormittag des 12ten October musste der Audienz bei dem regierenden Fürsten Sumangnukka Aru Rappang geopfert werden. Die Vorbereitungen zu diesem Empfange begannen damit, dass nicht allein der einzige im Besitze des Radja befindliche und uns geliehene Stuhl, sondern auch die eigenen Feldstühle weggeholt wurden. Die fürstliche Wohnung

befand sich jenseits des Marktplatzes, ein einfaches Gebäude, welches sich nur durch wenige ausserliche Kennzeichen von den übrigen unterschied. Zu diesen zählte wieder die nur unter stetigem Ausgleiten zu erklimmende schiefe Ebene (Sapana), welche in den gleich rechts vom Tamping sich befindenden Empfangsraum führt. Hier erwartete uns der Furst, ein langer, hagerer Mann mit grauem Schnurrbart und kurzgeschorenem Haar. Ein baumwollenes, durch einen goldenen Gürtel zusammengehaltenes Jäckchen verhüllte seinen Oberkörper, während sich um die Husten ein blau und schwarz karrirter Sarong schlang. Herr Brugman begann damit, dem Fursten ein Exemplar des s. Z. zu Makassar unterschriebenen Contractes einzuhändigen. Das Buch war in gelber Seide gebunden, mit vergoldeten Eckbeschlägen versehen und trug in der Mitte des Umschlages das niederländische Wappen. In derartigen Verträgen, die in Batavia oft wohl allzusehr nach der Schablone entworfen werden, verpflichten sich die eingeborenen Fürsten zu Dingen, welche sie ost kaum dem Namen nach kennen. Man kann sich eines Lächelns nicht erwehren, wenn man da liest, dass der Radja feierlichst erklart, die Kuhpockenimpfung befördern, Schulen grunden, sowie für die Instandhaltung und Anlage von Wegen Sorge tragen zu wollen. Von wirklicher Bedeutung sind ausschliesslich diejenigen Bestimmungen, welche einen solchen Potentaten zwingen die niederlandsche Flagge zu führen und ihm untersagen mit fremden Machten ohne Genehmigung der Indischen Regierung Verträge abzuschliessen. Theilnahmlos durchblätterte der Fürst das Buch und reichte dasselbe dem hinter ihm stehenden, mit einer grossen Brille bewaffneten Minister, dem Patta-Tallu-Lattaé (d. i. der Fürst der 3 Stände, nämlich als Haupt der Reichsgrossen, des Adels und der Volkspartei). Sodann wurde unser Pass überreicht und nachdem der Minister denselben gleichfalls eingesehen, erhielt ich denselben zuruck. Gleich beim Beginn der Sitzung hatte der Furst sich eine von Herrn Brugman angebotene Manilla-Cigarre angezundet. Wiederholt musste ihm aufs Neue Feuer gereicht werden, bis sie schliesslich weggeworfen, aber von einem der Hinterstehenden sofort als gute Beute aufgegriffen wurde 1). Nunmehr liess er sich eine Schale mit Wasser bringen und spulte sich damit coram publico den Mund aus. Nach Beendigung dieses Geschäftes ward ihm Siri gebracht und der beim Kauen desselben abgeschiedene rothe

¹⁾ Die Buginesen scheinen auf Cigarren, die sie Pelo's nennen, sehr versessen zu sein. Es ergeht ihnen damit aber wie halbwüchsigen Knaben und meistens müssen sie einen Glimmstengel schon nach wenigen Minuten weglegen.

Speichel einem hingehaltenen Spucknapse anvertraut 1). Nochmals wurde ein Wassergesass zum Ausspulen des Mundes gereicht und dann tischte der Kwee 2) Thee und Geback aus. Eine eigentliche Unterhaltung wollte nicht zu Stande kommen und war es daher eine willkommene Unterbrechung, als der kleine Nesse des Fürsten eine eigenthümlich gebaute zweisaitige Guitarre, Katjaping genannt, ergriff und mittelst derselben den eintönigen Gesang eines anderen Knaben begleitete. Der Text des Liedes lautete in der Uebersetzung: "Warum heirathet Ihr alten Leute, die Runzeln gehen doch nicht mehr aus dem Gesichte." Um 11 Uhr hatte unser Besuch sein Ende erreicht.

Teteadji ist eine der grössten Ortschaften in Sidenreng, die Zahl der Hauser, welche meist von mehreren Familien gemeinschaftlich bewohnt werden, wird auf 500 geschätzt. Im Centrum befindet sich der grosse Marktplatz, von welchem aus die Strassen, wenn eine derartige Bezeichnung gestattet ist, nach den verschiedensten Himmelsrichtungen auslaufen. Die eine führt nach dem in der Nahe befindlichen See von Sidenreng und an seinem nördlichen Ufer weiter. Eine zweite läuft gen Suden nach Watta, welcher Ort auch auf einem anderen Wege über Lisa erreicht werden kann. Ein weiterer Weg verläuft gen W. nach Masepe, von wo aus man über Tjaila gleichfalls nach Pare Pare gelangen kann und endlich ist zu erwähnen der gestern von uns betretene nach Amparita führende Pfad. Die Hauptgebäude, nämlich die Wohnung des Fürsten, sowie die Massigi (Moschee) liegen am Markte. Durch ein Palmengehölz von letztere getrennt liegt der sehr einfach gehaltene Begräbnissplatz bereits am Rande des Kampongs 3). Die Gräber sind von unbehauenen Steinen eingefasst, innerhalb des so gebildeten Rechteckes befindet sich sowohl über dem Kopfende, als über dem Fussende je ein einzelner Stein.

Die Wasserverhaltnisse sind, wie wir dies bereits am vorigen Tage

¹⁾ Alle diese Darreichungen geschehen von der linken Seite. Vergl. hierüber B. F. Matthes. Over de Ada's of gewoonten der Boeginezen en Makassaren, Versl. en Mededel. der K. Akad. v. W. (3), II, 1885, p. 145.

²⁾ Von kawé (Makass.) = impotens. Dieses Individuum war halb als Weib, halb als Mann gekleidet und soll ein Hermaphrodit sein. Ob dasselbe auch als Bissu fungirte, erfuhren wir nicht. Das Nähere über diese merkwürdigen Leute ist nachzulesen bei B. F. Matthes, (Over de bissoes of heidensche priesters en priesteressen der Boeginezen, Verhandel. der K. Akad. v. Wetensch., Amsterdam, Afd. Letterkunde, VII, 1872, p. 2 ff.).

³⁾ Siehe den Plan auf Taf. II, Fig. 3.

aus den in das Flussbett gegrabenen Löchern ersehen mussten, recht mangelhaft. Die wenigen Brunnen im Orte selbst liefern Brackwasser, welches nichtsdestoweniger Verwendung findet. Ganz in der Nähe unserer Wohnung war man damit beschäftigt einen neuen Brunnen anzulegen, doch hatte man in einer Tiefe 5½ m. noch kein Wasser erschlossen. Auf eine Schicht Dammerde von 1½ m folgte eine 2½ m. mächtige Bank von Trachyttuff und unter derselben bis zur Sohle ein aus Tuff-Fragmenten bestehendes Conglomerat.

Unter der Fuhrung des Capitano Sanré besuchte ich am 13ten Octh. den Bulu Lowa. Am Ausgange von Teteadji überblickt man bereits die einzelnen Bergkuppen, unter denen der Lowa durch seine regelmässige Kegelform hervorragt, den Hintergrund bildet der Bergrücken des Allakaradja 1). Wir ritten zunächst wieder nach Amparita und erreichten bald darauf den Kampong Punranga. Hier bogen wir von der Strasse ab und trotteten über die Reisfelder direkt dem Berge zu. Der schwere Boden war in Folge der langandauernden Trockenheit Septarien-ahnlich abgesondert, überall klafften die Risse. Die kleine Kuppe ragt unmittelbar aus der Ebene hervor und wo nicht der nackte Fels - ein lichtgrauer Phonolith - ansteht, bedeckt die Abhänge dürftiges Gras, sowie abgelöste Gesteinsblöcke. Ein schmaler, steiler Pfad führte zu dem 101 m. hohen Kegel hinauf. Der Gipfel schliesst mit einer 40 Schritt im Umfange betragenden Plattform ab. welche von einem Steinwalle umgeben ist. In der Mitte befindet sich ein zweiter Steinwall, der die Gräber der fruheren Fursten von Sidenreng umschliesst, über welche die sperrigen Aeste der mit weissen Bluthen behangenen Plumeria acutifolia, Poir. sich ausbreiten. Es ist geheiligter Boden, auf dem wir stehen, denn der Ueberlieferung zufolge ist an dieser Stelle einst der Begrunder der Dynastie, Namens Manurunga, vom Himmel herniedergestiegen! Alle übrigen Fürstengeschlechter auf Celebes leiten ihren Ursprung auf genau dieselbe Weise ab und in diesem Glauben wurzelt auch die Treue und Anhanglichkeit, welche die Buginesen ihren Herrschern zollen. Trotz des Schleiers, welcher über der ganzen Gegend lag, reichte unser Blick über das in S 70° O. liegende Teteadji hinaus, ein grosser Theil des Sees von Sidenreng (Tapparang Urai) mit seinen flachen Ufern konnte übersehen werden. In kurzem Abstande erhoben sich im N. die beiden durch einen kleinen Rücken verbundenen Kuppen des Bulu Alakkuwang, etwas niedriger als der Lowa-Etwas östlich davon, aber in weiterer Ferne zeigte sich der hohe, schroff

¹⁾ Taf. II, Fig. 2.

Lbsturzende Fels des Bulu Batu, an welchen sich der Rucken des Alla-Earadja anschliesst, der sich nach Westen fortsetzend den Horizont begrenzt. Fast genau im W. erblicken wir die Baumgruppen, welche den Kampong Tjaila (Tjela) verbergen und im SW. in etwa I Km. Entferlung ragt der Bulu Baula hervor. Nach unserem Abstiege begaben wir Ins nach einem kleinen schroffen Felsen Lingkaju genannt, welcher einige lundert Meter vom Lowa entfernt sich zu einer Höhe von 25—30 m. erlebt. Ein kleines, aus wenigen Hutten bestehendes Dorf, gleichen Namens lehnt sich unmittelbar an denselben an. Alsdann wurde der Rückmarsch nach Teteadji angetreten.

Wir hatten heute Gelegenheit die Bekanntschaft zweier neuer fürstlicher Personlichkeiten zu machen. Es war dies der Radja (Patta) Pilaé, "der Furst mit der rothen Fahne", Herr von Lagusi und in Kriegszeiten der Anfthrer (Punggawa) des gesammten Heeres von Wadjo, nebst seinem noffnungsvollen Sprösslinge, einem etwa 8 Jahre alten Bengel. Der erstzenannte machte mit seinen glotzenden Augen und dem aufgedunsenen Gesichte einen höchst widerwärtigen Eindruck, auch sein Auftreten war nicht der Art, um eine bessere Meinung von ihm zu gewinnen. Er begann damit den weissen Helmhut des Herrn Brugman zu annektiren, nach 2 Tagen war er desselben jedoch schon überdrüssig geworden und zierte diese Kopfbedeckung nunmehr den Schadel eines seiner Begleiter. Alsdann warf er begehrliche Blicke auf die Brille von Prof. Weber, sowie auf meinen grauen Leinenanzug, ohne jedoch Gegenliebe zu finden. Wie man sagt, kann man sich solche Käuze nur vom Leibe halten, indem man ihnen bemerkt, dass der gewünschte Gegenstand ein Erbstück oder Eigenthum der "Compagnie" sei. Gar oft kam er in unser Gemach, stierte uns eine Weile an und zog, schweigend wie er gekommen war, wieder von dannen. Der Sohn - muthmasslicher Thronerbe von Sidenreng - unterschied sich von seinen Altersgenossen bereits hinsichtlich seines Aeusseren, indem man ihm sofort ansehen konnte, dass er das Wasser höchstens von seiner trinkbare Seite kennen gelernt habe. Ausserdem war er mit Amuletten, kleinen in unsaubere Stückchen Zeug gehülten Sprüchen aus dem Koran, behangen. Er erschien in steter Begleitung eines kleinen Sklaven, der mit 2 Metallbecken (Kanjtjing) versehen war, die von Zeit zu Zeit geschlagen wurden, um die Setan's fern zu halten. Von dem Volke in dem wahrsten Sinne des Wortes auf den Händen getragen, konnte dieser Bursche seinen Launen freien Lauf gewähren, kein Wunder, dass aus so vielen Fürstensöhnen sich Taugenichtse entwickeln. Ein weit aus erfreulicheres Bild lieferte die übrige Kinderwelt. Sobald

des Tages Haue sich gewählert hatte, konnte man die Kleinen mit dessehlen Elder, wie er missier Jagend eigen ist, auf dem Marktplatze ihren Spielen sollegen seinen 7 und draussen über den Stoppelfeldern schweiten Ermstude von Erachen, deren Gestalten den japanischen nachgeahnt erscheinen.

Unser Ausfug am folgenden Tage, zugleich unser letzter in der Ungegend von Totale, gair dem Kampong Maseje, der in früherer Zeit wiederschilde Resident der Fersten von Sidenreng war. Der Weg führt it wasterier Richttag durch Reisfelder und wird in etwa ? Stunden inrickgebert. Man seisse bald auf den Fluss von Maseje, der sich in des See von Silveray erzieust und dessen Laufe wir folgten. Klares Bergwasser bies in demselben dahin, seine zahlreichen Gerölle gehören dem Apiest and Papacith an, von welchen ersterer auch im Orte selbst anstehend gefanden wurde. Bald nach unserer Ankunft in dem von zahlreichen Edamen umgebenen und durchsetzten Kampong, der nebenbei bemerkt auch der grösste im Reiche ist, gesellte sich zu uns ein betwbanter Gress, der Hadschi Masso, einer der "Schwiegerväter" des Radia. Derselbe gelettete uns zu den gesuchten Quellen, welche sich am nordwesthatten Ende des Ortes und zwar am, sowie im Flussbett befinden. Les grésses der Quellen mundete in ein 1 m. langes und 1-2 m. breites hassin aus. Die Temperatur des Wassers wurde zu 69° C. bestimmt. Dem boden des Beckens entsteigen in unregelmässigen Zwischenräumen zahlreiche Gasblasen, doch fand nur an dem einen aussersten Ende ein constantes und ziemlich lebhaftes Aufwirbeln statt. An dieser Stelle hatte sich innerhalb des grossen, ein kleines kraterahnliches Becken gebildet. Trotz der starken Schweselwasserstoffentwicklung, welche von einer Abscheidang von Schwefel begleitet war, vegetirten am Rande des Bassins noch einige Algen. Etwa 40 Schritt nordwestlich von dieser Quelle findet sich ganz nahe am Flussuser eine zweite. In dem Becken derselben fand kein Aufwallen von Gasblasen statt, die Temperatur des Wassers betrug 6710 C. Der Durchmesser der fast kreisrunden Kumme betrug nur 20 cm., die Tiese derselben nicht ganz so viel. Die kleinen Rollstücke, welche diese Quelle einfassen sind mit einer dunnen Schweselkruste bedeckt. Hart am User, sowie im Bachbett selbst brechen noch eine Anzahl kleinerer Quellen hervor, die ersteren besitzen eine Temperatur von 51°C. und weniger, die letzteren sind durch das Aufwirbeln von Gasblasen erkennbar.

¹⁾ Ein Verzeichniss dieser Spiele giebt B. F. Matthes in seinem Werke: Bijdrages tot den Ethnologie van Zuid-Celebes, 's Gravenhage 1875, p. 128—130.

achdem unsere Sammlungen vervollständigt waren, folgten wir einer inladung des Hadschi, um in seiner Behausung eine Erfrischung einmehmen. Es war dies eines der stattlichsten Gebaude, welches wir im ande sahen, in welches sogar eine breite, bequeme Treppe führte. Der lte Masso war aber auch eine angesehene Persönlichkeit. Geboren "in em Jahre, in welchem der Ausbruch des Tamboro auf der Insel Sumswa stattfand" d. i. 1815, hat er es möglich zu machen gewusst, zwei-1al nach Mekka pilgern zu können und steht daher auch in dem Gesche grosser Frömmigkeit, die bekanntlich niemals schadet. Er hat es enn auch weidlich verstanden, wenn auch nicht das Fleisch und Blut des ammes, so doch die Wolle desselben einzuheimsen. Während nun einige ocosnusse skalpirt wurden, um den besten Erfrischungstrank, welchen ie Tropen zu spenden vermögen, unserem Munde zugänglich zu machen, rurden wir ausgefragt. Nachdem die Wissbegierde des Alten befriedigt rar, fing er selbst zu erzählen an und zwar nicht ohne Humor. Wir erielten auf diese Weise über mancherlei Dinge Auskunft. So vernahmen rir u. A. auch, dass den oben erwähnten heissen Quellen eine heilkräftige Virkung zugeschrieben wird, namentlich gegen Hautkrankheiten. Auch der ladja gebraucht eine derartige Badekur, sobald er an Ausschlag leidet. Vachdem uns schliesslich Thee gereicht worden war, der aber, da er n der Nähe von ranzigem Cocosol aufbewahrt worden war, ganz abscheuich schmeckte, verabschiedeten wir uns und wanderten direkt nach Teeadji zurück. Hier angekommen musste der grösste Theil unserer Sachen gepackt werden, da ein Theil der Lastträger noch im Laufe des Nachnittags nach Tempé abziehen sollte.

Die Lust hatte in den letzten Tagen einen so hohen Grad von Troktenheit erreicht, dass sogar das Packpapier von selbst einrollte. Auch die Temperatur unterlag erheblichen Schwankungen und zwar zwischen 21°C. und 34°C. innerhalb 24 Stunden.

In den ersten Abendstunden wurde uns noch das Schauspiel des Masimpe-Spiels geboten, welches auf dem Marktplatze unter den Fenstern der fürstlichen Wohnung stattfand. Die Bevölkerung bildete einen weiten Kreis, innerhalb dessen die Kampfe ausgefochten werden. Ein Mann fungirt als Unparteiischer, dem nicht allein die Entscheidung über den Ausgang des Beingefechtes zusteht, sondern der auch die zuweilen in zu grossen Kampfeifer Gerathenden trennt. Zwei Leute treten nun aus der Corona, stellen sich einander gegenüber, worauf Jeder derselben in die eigenen Hände und sodann in diejenigen des Gegners klatscht. Dieses geschieht dreimal und dann geht's los! Als Waffen dienen ausschliess-

lich die unteren Extremitaten, wobei die Aufgabe darin besteht des Gegner durch einen Fusstritt in den Bauch unschadlich zu machen. Anfangs gehen beide Kampfer vorsichtig zu Werke, ab und zu wird das Bein zum Stosse ausgestreckt, bald aber kommt die heissblütige Natw zum Durchbruch. Wild stürmen die Gegner auf einander ein, die Kopftücher fallen herab und Mahnen gleich flattern die langen schwarzen Haare umher. Es regnet Fussstösse, die klatschend gegen die Waden sahren, bis ein wohlgezielter Streich dem Kampse ein Ende bereitet. Zeweilen fallen auch Lufthiebe, in Folge dessen ein Streiter wohl dzs Gleichgewicht verliert und unter allgemeinen Gelächter zu Boden fallt. Sobald Einer kampfunfähig geworden oder das Gefecht resultatios verlaufen ist, treten neue Kampfer auf. Selbst kleine Knirpse von 7-8 Jahren versuchen auf diese Weise ihre Kräfte zu messen und erzielen dabei wenigstens Heiterkeitserfolge. Nach einiger Zeit wurde das Spiel abgebrochen, da der Radja sich anschickte unseren vorgestrigen Besuch zu erwiedern. Derselbe erschien an der Spitze eines grossen Gefolges, dem sich die Volksmenge anschloss und den ganzen Raum des Gemaches ausfullte. Auch eine alte Prinzessin stellte sich noch ein, welche sich noch des Besuches der Frau Ida Pfeiffer erinnerte und nun zum zweiten und voraussichtlich letzten Male eine europäische Dame in diesem abgelegenen Orte begrüssen durste. Der Unterhaltungsstoff war bald erschöpft und ohne Kummer sahen wir die Herrschaften zu Herrn Brugman ziehen, wo dieselben noch während einiger Stunden den Jammertönen lauschte, die der Pangeran Lasasso seiner Geige entlockte. Ehe wir uns zum Abendessen niedersetzten, mussten jedoch erst die Spuren, welche das fürstliche Gefolge hinterlassen hatte, getilgt werden. Der Fusboden war nämlich mit Tabak und Siri vollgespieen.

In der Morgenfrühe des 15ten Oct. standen Alle rechtzeitig zum Abmarsche bereit, aber erst um 8½ Uhr konnten wir in Folge des verspäteten Eintreffens einiger Pferde wegreiten. Unser Pfad wies zunächst gen Süden. Nachdem Teteadji verlassen war, ging es durch Sawas weiter und liessen wir zur Rechten in etwa 1 Km. Entfernung den Kampong Lise liegen. Gegen 9 Uhr kamen wir unfern des Kampong Saleoi vorbei, während zur Linken das braunschwarze, schlammige Ufer des Sees von Sidenreng kaum 300 m. entfernt blieb. An Stelle der Reisstoppelfelder tritt allmählich Grasland, auf welchem zahlreiche Riedgräser, eine Art Polygonum, sowie eine roth blühende Papilionacee üppig gedeihen. Zur Rechten zieht sich ununterbrochen bis Watta ein Wald hin. Während der Regenzeit soll das Wasser des Sees sich bis zum Waldsaume aus-

lehnen. Der Verkehr zwischen Sidenreng und Tempé findet während des rössten Theiles des Jahres zu Schiff statt. In Folge der aussergewöhnichen Trockenheit war der untiese See von Tempé fast leer gelausen, so lass aus diese Art der Besörderung verzichtet werden musste. Nach etwa stündigem ununterbrochenen Marsche kamen wir in der Nähe des Kampong Watta traurigen Angedenkens vorbei. Hier sand am 21ten April 1833 das bekannte unglückliche Gesecht gegen Datu Lampullä, welcher einem Bruder Lapangorisang, dem rechtmässigen Radja von Sidenreng 1840 der Krone trachtete, statt 1). Bis zum Jahre 1852 hatte dieser Brulerkrieg mit zeitweiligen Unterbrechungen gewährt und so gerieth Watta 1841 in den Besitz dieser, bald in den jener Partei. Auch der untersehmungssüchtige James Brooke, welcher als Radja emeritus von Saravak sein vielbewegtes Leben beschloss, war im Februar 1840, von Tempe tommend, bis nach Watta, dem Endpunkte seiner Reise gelangt 2).

Wir blieben einige Hundert Meter abseits des Kampongs, doch strömte riel Volk aus demselben herbei, um sich unseren Zug anzusehen. Nach reiteren 20 Minuten langten wir an einen Halteplatz an, wo einige Waongs und leerstehende Hutten sich befinden, welche die Gelegenheit darboten die mitgenommenen Speisen unter einem gegen die Sonnenstrahlen schutzenden Dach einzunehmen. Dieser Ort gehört bereits zu Mario-ri-awa (Unter-Mario), einem Vasallenstaat von Soppeng. Kurz vor unserem Eintreffen an diesem Punkte hatten wir uns einem Bache genähert, welcher den Namen La-Sassangriwu führt. Derselbe nimmt die gesammten, dem See von Sidenreng entströmenden Wassermengen auf, um sie dem See von Tempé, beziehungsweise dem Minralang direkt zuzusühren. Der letztere Fall sand während unserer Anwesenheit statt, da, wie schon erwähnt, der See von Tempé auf ein Minimum reducirt war. Bis vor kurzer Zeit war man der Meinung gewesen, dass beide Seen ein einziges Becken darstellten und zwar ist es Matthes gewesen, der diesen Irrthum berichtigt hat 3), trotzdem haben alle Karten bis in die neueste Zeit, so auch der grosse Atlas von Stemfoort und ten Siethoff die Angabe eines einheitlichen, grossen Sees beibehalten. Es verdient jedoch hervorgehoben zu werden, dass sowohl James Brooke, wie 1da Pfeiffer, die beide diese Gegend sogar zur Regenzeit besuchten, ausdrücklich die An-

¹⁾ P. B. van Staden ten Brink, Zuid-Celebes 1884, p. 76.

²⁾ Rodney Mundy, Narrative of the events in Borneo and Celebes. London 1848, Vol. I, p. 104.

³⁾ Bijdragen tot de Taal-, Land- en Volkenkunde van Ned. Indië, (4), I, 1877, p. 527.

wesenheit zweier Seen konstatiren. Die letztgenannte hat sogar den La-Bassangrinnu befahren und aus ihrer Beschreibung ist zu ersehen, das selbst zur Zeit des höchsten Wasserstandes dieser Fluss immerhin noch eine Länge von etwa 2½ Kilometer besitzt 1). Die gewaltige Depression, inmitten welcher sich die erwähnten beiden Seen befinden 2), bietet eines der interessantesten hydrographischen Probleme dar. Ohne mich auf eine eingehende Darlegung der Verhältnisse an diesem Orte einzulassen, möge nur hervorgehoben werden, dass dieses grosse Becken von allen Himmelsgenden aus gespeist wird. Was der Latibodjong im N., der Bulu Boute Uhe und andere Berge im S., sowie die Gebirgszüge im O. und W. spenden, fliesst vereinigt in der Gegend von Tempé zusammen, um alsdann mittelst einer einzigen Wasserader in den Meerbusen von Bout befördert zu werden.

Nach anderthalbstündiger Rast brachen wir wieder auf. Der Weg führte von jetzt ab ununterbrochen längs des Users des La-Sassangrieus, welcher eine konstante Breite von etwa 3 m. besass und einen so geraden Verlauf hatte, dass man meinen konnte er sei ein Kanal. Sein Wasser stellte eine trübe, fast stagnirende, chokoladenfarbene Flussigkeit dar, welche einige flachgehende Boote nicht hinderte, sich stromaufwarts zu bewegen. Im Osten ragten in der Entsernung einiger Kilometer Baumgruppen hervor, zwischen denen sich der Kampong Belawa befindet, sonst gewahrt man, so weit das Auge reicht, nur eine gleichförmige, ode Grasflache. Wo der Boden etwas vegetationsarm ist, sieht man denselben bedeckt mit ungeheuren Mengen von Melanien und Corbula's, welche ihr bisheriges beschauliches Dasein mit dem noch beschaulicheren, nämlich fossil zu werden, zu vertauschen im Begriffe sind. Nachdem wir etwa 3 Stunden weiter geritten waren, wurde der Boden so morastig, dass die Pferde bis über die Kniee einsanken. Da auch unser Führer keinen guten Pfad wusste, so beschlossen wir abzusteigen, zumal unsere Last eine für die kleinen Thiere viel zu schwere war, als dass diese uns durch den Sumpf zu besördern vermöchten. Hierauf wurden zwei mittlerweile den La-

¹⁾ Meine zweite Weltreise, Wien 1856, II, p. 248.

²⁾ Der See von Sidenreng heisst bei den Buginesen Tapperäng Uraï d.i. das West-Meer, der See von Tempe, Tapperäng Karadja d.i. das grosse Meer, doch darf das letztere auf diesen Namen nur während der Regenzeit Anspruch erheben. Die von demselben eingenommene Fläche hat dafür aber die Aussicht dereinst die Kornkammer von Celebes zu werden, bis zu welchem Zeitpunkte allerdings noch ungezählte Wassermengen den Tjenrana abwärts fliessen werden.

Sassangriwu herauskommende Boote angehalten, um auf diesem weiter m fahren. Aber auch dieser Versuch scheiterte in der kläglichsten Weise, la die so belasteten Fahrzeuge in dem schlammigen Wasser nicht vorwarts zu bewegen waren. Es blieben somit als einziges Vehikel nur die tigenen Beine abrig, die sich denn schliesslich mit Erfolg durch die norastige Strecke hindurchwanden. Später wurde der ununterbrochen angs des Flusses eingeschlagene Pfad besser. Nach weiterer, einstundiger Wanderung erblickten wir im SO. zuerst die hinter Tempe liegenden Berge und nach einer weiteren halben Stunde gelangten wir endlich an den wasserreichen Fluss Minralang, welcher aus dem See von Tempé tommt oder richtiger gesagt denselben durchschneidet. Denn es ist klar, lass ein ausgetrocknetes Becken so grosse Wassermengen nicht zu liefern rermag, selbst wenn in dasselbe Quellen einmunden 1). Hinter dem Vereinigungspunkte des La-Sassangriwu und dem Mineralang befand nich ein Häuschen, welches dem Fürsten von Wadjo gehört und wo dessen Sohn zu fischen pflegt. In unmittelbarer Nähe desselben harrten anserer eine Reihe langer, schmaler Boote, Lêpa-Lêpa genannt, welche uns nach Tempé zu bringen sollten. Nachdem sämmtliche Theilnehmer untergebracht waren, begann die lustige Fahrt. Es war ein grosses Vergnügen sich von diesem frohmuthigen Volke den Strom abwärts treiben zu lassen. Ein Canoe suchte es dem anderen an Schnelligkeit zuvor zu thun, laute Freude gab sich kund, wenn eines das andere überholt hatte und schallendes Gelächter ertönte, wenn ein übereifriger Ruderer durch ungeschickte Handhabung seines Werkzeuges die Nachbarn bespritzte. Das sind nun die als trotzig und widerspanstig verschrienen Buginesen! Freilich so unterwurfig und höflich als die Javanen sind sie nicht, aber ein billiger Beurtheiler wird das Bischen Selbstbewusstsein eines Volkes wohl zu schätzen wissen. Auch soll nicht verschwiegen werden, dass unsere Leutchen nicht die geringste Vergütung für ihre Mühe erhielten und selbst ein ihnen dargereichtes Geldgeschenk auf Befehl des Fürsten zurückerstatten mussten. Unaufhaltsam geht die Fahrt weiter. An den 1-21 m. hohen Steilabsturzen findet sich ein gelblicher, dunngeschichteter Thon entblösst, während das umliegende Land mit Mais bepflanzt ist. Ausserordentlich gross ist die Zahl der hier hausenden Vögel, namentlich Ibis, kleine Falken u. A., welche sich durch die lärmende Ruder-

¹⁾ Wahrscheinlich ist der östlich von Belawa bei Lowa in den See von Tempe einströmende Tasililu der Quellfluss des Minralang. Der Fluss von Bila kann diese Rolle nicht spielen (vergl. P. B. van Staden ten Brink, Zuid-Celebes, p. 111).

gesellschaft in keiner Weise stören lassen. Bekunden jene Rauber bereits den Fischreichthum des Mineralang, so erhellt derselbe noch mehr aus den zahlreichen Zero's, welche quer über den Fluss angebracht sind und den Booten nur einen schmalen Durchgang gestatten. Endlich erscheint gegen 5 Uhr der Kampong Bakee am rechten Ufer, gleich darauf folgt am linken Uralsalo und wenige Minuten später, nachdem die Mundung des Bila-Flusses passirt ist, landen wir unter dem Zulaufe des Volkes bei Tempe. Die uns angewiesene Wohnung, welche nur wenige Minuten entfernt lag, war bald erreicht und erklommen.

Am folgenden Vormittage traf der am La-Sassangrinou stecken gebliebenen Rest unserer Gepäckes ein, so dass die häusliche Einrichtung erst im Lause des Tages vollendet werden konnte. In den Nachmittagsstunden fand sodann die Vorstellung bei dem Aru Matowa, nachdem derselbe seinen ersten Opiumrausch glücklich überstanden, statt. Am Eingange der fürstlichen Behausung waren die Mannschaften der Leibwache (Pabarisi's) zu einem Gliede formirt, um unter dem Commando eines Unteroffiziers die Honneurs zu erweisen. Die Gemeinen trugen eine einfache blaue Uniform, auf dem Schädel prangte dagegen eine knallrothe Narrenkappe mit gelber Troddel. Die Kopf bedeckung des Unteroffiziers bestand aus einem Dreimaster in derselben Couleur. Die halbverrosteten Feuersteingewehre suchten zweiselsohne über die Thatsache, dass das Munitions-Magazin eine Anzahl trefflicher Repetirgewehre barg, wegzutäuschen. Nach dem Durchschreiten einer Art Vorzimmer gelangten wir in eine weite Halle, welche am ehesten noch mit einer festlich verzierten Scheune verglichen werden kann. An der Hinterwand befand sich der Eingang zu den Frauengemachern. Rechts und links davon hingen zwei Spiegel die von vergangener Pracht zeugten. Nur nothdurftig hielten die Rahmen noch zusammen, während die Scheiben völlig erblindet waren. Dieselbe Wand zierte noch einige schlechte Lithographieen, eine Ansicht von Konstantinopel, sowie einige Beherrscher der Gläubigen darstellend. Hier an dem unteren Ende des Raumes empfing uns der Aru Matowa 1),

¹⁾ Wadjo ist ein Wahlreich in dessen Verwaltung sich nicht weniger als 40 fürstliche Personen theilen. Der Aru Matowa ist der eigentliche Herrscher, dem jedoch 6 Hauptfürsten (Pätta-ännänge) zur Seite stehen nämlich: 1) Pätta Betempola, 2; Pätta Pildë, 3) Pätta Ranrängé-Talotärreng, 6) Pätta Ranrängé-Talotärreng, 6) Pätta Patolaë. Diese 6 Fürsten wählen den Aru Matowa, können ihn aber auch absetzen. Ausserdem giebt es noch 30 Fürsten niederen Ranges und drei fürstliche Gesandten. Ausführlicheres über diese zum Theil recht verzwickten Verhältnisse

der einstmals ein stattlicher Mann gewesen sein muss, jetzt aber in Folge übermässiger Opiumschwelgerei arg reducirt war. Traurig stimmte ihn zudem die durch einen Fischhaken sich selbst zugezogene Verletzung der rechten Hand. In Folge Vernachlässigung oder unrichtiger Behandlung war die Wunde vereitert und von einer ekelhaften Schmutzkruste umgeben. Die Gemahlin des Fürsten hatte sich hinter dem Stuhle desselben aufgestellt und liess sich keines der gesprochenen Worte entgehen, wie man denn überhaupt den Eindruck erhielt, als ob sie das Hest in Handen habe. Nachdem die Audienz endlich ihr Ende erreicht hatte, blieb uns vor Einbruch der Dunkelheit noch die Zeit zu einem kleinen Spaziergange durch den Ort. Tempé wird im Westen durch den Bila-Fluss begrenzt. Jenseits desselben dehnt sich eine Grassläche aus, welche zur Regenzeit einen Theil des Sees von Tempé mit ausmacht. Das linke Ufer, an dem wir - lediglich durch eine Hauserreihe getrennt - entlang wandern, liegt höher und besteht aus einer Lössablagerung, welche sich auch noch weiter nach N. ausdehnt. Den Angaben der Eingeborenen zufolge soll der Fluss von Bila am Latibodjong entspringen.

Als wir auf den Marktplatz zurückkehrten, beschien der eben aufgegangene Mond eine malerische Scene. Umringt von einem Kreise zahlreicher Zuschauer führten 7 Tanzmadchen, Padjogé genannt, ihre Bewegungen aus. Dieselben bestanden in einem Auf- und Abschreiten, in Drehungen, bei denen der in der einen Hand gehaltene Fächer eine grosse Rolle spielte. Zu dem eintönigen, näselnden Gesang, in welchem Djumpandang 1) häufig genannt wurde, lieferte ein mit den Fingern bearbeitetes trommelartiges Instrument, sowie ein Paar Becken, die Begleitung. Das Gewand dieser Tänzerinnen besteht in einem rothen Jäckchen, welches den Oberleib einhüllt, während der Sarong in anderen bunten Farben leuchtet. Ein grosser Kamm, von dem aus lange Ketten herabhängen, hält das Haar zusammen. Ab und zu tritt ein Mann aus dem Kreise hervor, um mit einem der Mädchen gemeinschaftlich derartige pantominische Bewegungen auszuführen, wofür einige Deute zu entrichten sind, welche in die fürstliche Kasse fliessen. Noch in später

findet man bei B. F. Matthes, Over de Wadjorezen met hun handels- en scheepswetboek, Makassar 1869, p. 5 ff. — Der zur Zeit regierende Aru Matowa heisst Abdul Rachman Lakoro Aru Padali.

¹⁾ Abkürzung für *Udjong Pandan* (Ananas-Kap). Es ist dies eigentlich das Vorgebirge vor dem *Fort Rotterdam*. In früherer Zeit befand sich jedoch an Stelle des letzteren auch ein Kampong *Udjong Pandan*, und nun wird im Innern des Landes *Makassar* noch heutigen Tages mit diesem Namen bezeichnet.

Abendstunde drang der Schall der Trommel gemengt mit den Stimmen der Padjogé's in unser Gemach hinauf.

Am User des Minralang bei Tempé stehend, erblickt man eine Reihe wenig hoher Berge, welche das Becken im Osten abschliesen. Der Ara Matowa hatte uns für den 17ten October Pferde, sowie Begleiter gestellt, um uns Gelegenheit zu geben diese Bergkette zu besuchen. Der Weg führte zunächst am linken Ufer des Minralang entlang. Kurz vor dem Kampong Sengkang erblickten wir einen aus den Süden kommenden Nebenfluss, welcher zum Unterschiede von dem Minralang krystallklares Wasser führte. Unsere Begleiter nannten ihn La-Palupa 1), zweisellos ist derselbe aber identisch mit dem Walannaë der topographischen Karte. Auch James Brooke giebt ihm bereits diesen Namen. Nach wenigen Minuten hatten wir das ausgedehnte Sengkang erreicht, dessen Häuser sich zum Theil in einem arg vernachlässigten Zustande befanden. Man erzählte uns, dass die nöthigen Reparaturen erst zur Ausführung gelangen wurden, wenn die Regenzeit eingetreten sei. Bereits im Kampong schlugen wir eine südöstliche Richtung ein und gelangten so in die fruchtbare mit Reisseldern bedeckte Ebene, welche zwischen dem Fluss und der Bergkette liegt. Nach ? stündigem Ritte hatten wir den Fuss des Bulu (Berg) Ulawang erreicht, einen kahlen Hugel, der ganzlich aus einem Sandsteine besteht, dessen N-S streichende Schichten nach W. einfallen. Von dem Gipsel aus überblickt man die zu den Füssen liegende Ebene mit ihren volkreichen Dörfern und den in starken Krümmungen dahinrauschenden Strom, man gewahrt ferner, dass der Ulawang das Glied einer Kette darstellt, die sich erst gen N. und später nach NO. wendet, anderseits nach Süden in eine SSO.-Richtung übergeht, um sich hier mit einer zweiten Hügelreihe zu vereinigen. Der Abstieg erfolgte am östlichen Abhange und hier fanden sich nahe am Fusse dem Sandsteine eingeschaltete Banke mit zahlreichen Muschelresten. Es ging nunmehr nordwarts zwischen den beidem Bergketten hindurch, wir durchquerten alsdann auch die östliche derselben und stiessen hier auf den steilen, fast isolin sich erhebenden Bulu Tjita. Am Fusse desselben entspringt eine Quelle, welche Brackwasser liefert. Oberhalb derselben findet sich am Südabhange

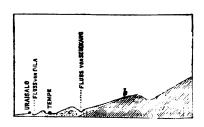
¹⁾ Richtiger wohl La-Paduppa, doch versteht Matthes (Bijdragen tot de Taal-, Landen Volkenkunde (4), I, 1877, p. 527) darunter etwas Anderes, nämlich den Abschnitt des Minralang zwischen Tempé und Sengkang, in welchen der Walannaë einmundes, während nach unseren Informationen der untere Lauf des letzteren diesen Namen führt (siehe Taf. II, Fig. 4).

ein ausgezeichneter grobkrystallinischer, aber sehr löcheriger Kalkstein in dicken Banken aufgeschlossen, welche in N 40° W. streichen, mit einem Einfallen von 45-50° nach SW. Das Gestein wird von der Bevölkerung Batu Damar genannt, doch konnte weder der Geruch, noch eine sonstige Eigenschaft des Dammarharzes daran entdeckt werden. Der steil ansteigende Berg besitzt eine Höhe von 85 m. und gestattet die Umschau über die westliche Kette hinweg. In NW. gewahrt man einen schmalen Wasserspiegel, der bescheidene Rest der "grossen Sees", dahinter liegen Baumgruppen, zwischen denen sich der Kampong Belawa verbirgt. Nach Osten schweift der Blick frei über das flache Land, welches zum grossen Theile mit Bananen- und Palmenanpflanzungen bedeckt ist. Eine kleine Depression wird von dem See La-Salima in etwa 7 Km. Entfernung ausgefüllt. Das Thal zwischen den beiden Hügelketten enthalt gleichfalls Bananengärten. Nach einer kleinen Rast wurde der Rückweg angetreten, welcher uns noch weiter nordwärts führte. Eine Schwenkung in nordwestlicher, endlich in westlicher Richtung führte durch Bergreihen hindurch nach Sengkang, von wo aus Tempe bald erreicht wurde. - Ein zahlreiches Gefolge hatte sich auf diesem Ausfluge uns angeschlossen, bei welcher Gelegenheit die vornehmeren Wadjoresen hoch zu Ross und ausserdem mit einer Lanze bewaffnet erschienen waren. Ueberhaupt sind die Buginesen als Reiter berühmt, sie wissen in kurzester Frist selbst das wildeste Pferd zu bandigen und sitzen darauf wie mit demselben verwachsen. Da sie keinen Sattel benutzen, so ermuden allmählich die Beine, welche alsdann abwechselnd von Zeit zu Zeit quer über den Rücken des Pferdes gelegt werden.

Am Nachmittage wurde noch eine kleine Exkursion nach dem La-Palupa (Walannaë) unternommen. Bereits bei Tempé selbst, ferner am Ufer des Minralang bis Sengkang, sowie auch am Ufer der La-Palupa fanden sich zahlreiche Reste von Gasteropoden und Korallen, welche einer pleistocanen Ablagerung der Umgegend entstammen müssen. Es darf gewiss als ein Zeugniss für die Aufgewecktheit der Bevölkerung gelten, dass die Leute, nach dem Fundorte derselben befragt, erklärten, dieselben entstammten dem Meere und "tempo dulo" sei hier auch einst Meer gewesen. Sie halfen auch mit sammeln und ein niedlicher Schlingel suchte sogar recente Süsswassermollusken mit einzuschmuggeln. Vor der Mündung des Wallannaë liegt eine Sandbank. Die Ufer desselben fallen steil ab und erheben sich bis mehr als 3 m. über dem Wasserspiegel; sie bestehen aus horizontal gelagerten lehmigen Schichten, welche unter dem Andrang der Fluthen häufig abbröckeln und ein kleines Vorland

im Bett des Flusses bilden. Später setzten wir nach dem linken User uber und konnten in der ausnahmsweise klaren Abendlust die Bergmassen von Soppeng im SW., sowie die am 15ten passirten Berge im W. erblicken. Im Norden ragte scheinbar ganz isolirt die hohe Kuppe des Latibodjong hervor, welcher zwei Tagereisen entsernt, bereits zum Gebiet von Luwu gehören soll. Bei dem Kampong Maniyangsalo (d. i. im Süden des Flusses) liessen wir uns über den Minralang setzen und erreichten alsbald wieder unsere Behausung.

Abends erhielt Frau Weber noch den Besuch der Gemahlin des Fürsten, Namens Malo, welche von der Nichte desselben, Gau di Malino, begleitet war. Diese beiden alten Damen waren ausserordentlich aufgeraumt. Sie vergnügten sich u. A. damit buginesische Worte zum Nachsprechen aufzugeben und fanden es sehr komisch, wenn dieselben mit falscher Betonung wiedergegeben wurden. Zur Strafe dafür mussten sie nun aber hollandische Worte nachsprechen, was ihnen jedoch nur in mangelhafter Weise gelang. Die Wiedergabe des f und v erschien geradezu unausführbar und so sagten sie z. B. Stockpis für Stockfisch. Schliesslich machte sich jedoch die Müdigkeit in so ausgedehntem Maasse geltend, dass wir herzlich froh waren, als die Tanten sich verabschiedeten.



- a. Neogener Sandstein.
- t. Austernbank.
- c. Löss.

Am folgenden Tage (18 Oct.) galt es das nördlich und nordöstlich von Tempé gelegene Gebiet einer Betrachtung zu unterziehen. Wie bereits erwähnt zieht sich am linken Ufer des Bila-Flusses ein niedriger Lössrücken hin, welcher bis zum Begräbnissplatze, der sich auf einem Hügel oberhalb einer Krümmung des Flusses erhebt, verfolgt wurde. In ONO.-Richtung fortschreitend, gelangte ich an

einen Bach, welcher dem Bila-Fluss parallel verläuft und sich bei Sengkang in den Minralang ergiesst. Sein enges Bett war in den Löss eingeschnitten. Jenseits desselben ging es fortwährend durch Bananenanpflanzungen und sonstiges Culturland, bis die aus neogenem Sandstein
bestehenden niedrigen Vorhügel der Bergkette erreicht wurden. Beim
Anstieg der letzteren — einer Fortsetzung der gestern besuchten Berge —
tritt dasselbe Gestein wieder zu Tage mit dem N—S.-Streichen und dem
steilen Einfallen der Schichten (50—55°) nach W. Alle diese Berge sind

bis auf geringe Reste abgeholzt und so erscheint es räthselhaft, woher die Bevölkerung das nöthige Feuerholz nimmt, falls dasselbe nicht etwa durch stromaufwärts kommende Boote herbeigeschafft wird. Tempé allein kann man bereits auf etwa 16000 Einwohner schätzen, Sengkang ist auch nicht viel kleiner. Rechnet man noch die in unmittelbarer Nachbarschaft liegenden Dörfer Uraisalo, Bakkee, Maniyangsalo und Amangsalo hinzu, so gelangt man zu der Zahl von mindestens 30000 Menschen, die auf diesem Fleckchen Erde beisammen wohnen. — Der Ruckmarsch nach Tempé erfolgte auf direktem Wege und hier wurde am Westabhange eines Hügels eine Austernbank gefunden. Tausende von Schalen lagen umher, während andere Reste, so von Spondylus und Cidaris sehr spärlich vertreten waren. Die genannte Ablagerung gehört wohl dem älteren Pleistocan an, jedenfalls ist sie älter als der Löss.

Am Nachmittage gab die Bevölkerung uns, wie in *Teteadji* das Schauspiel des Masimpe-Spiels zu geniessen, während Herr Assistent-Resident Brugman ein lichte Stunde des Fürsten benutzte, um mit demselben wegen des abzuschliessenden Contractes Verhandlungen anzuknüpfen ¹).

Um die Lage der umliegenden Ortschaften und Berge zu bestimmen, rückte ich am 19^{ten} Octbr. nach dem Bulu Sengkang aus, welcher sich im O. des Kampongs gleichen Namens erhebt. Die Häuser von Sengkang dehnen sich bis zum Fuss des Berges aus, die Vorhügel sind mit Cocos-Palmen bedeckt und dahinter geht es steil bergan, um dem

¹⁾ Der Vertrag kam bald nach unserer Abreise von Tempé am 8ten November wirklich zu Stande. Bereits am 23ten Dec. 1670 war zu Makassar ein Traktat zwischen der "Compagnie" und Wadjo geschlossen worden. Am 25ten März 1741 erzwang der Gouverneur Smout abermals die Unterwerfung, oder wie es euphemistisch heisst "Bundesgenossenschaft", doch wurde dieser Vertrag nicht unterzeichnet und wenigstens in späteren Jahren seitens Wadjo auch garnicht anerkannt. Als im December 1859 das niederländisch-indische Heer bis Pompanuwa sm Tjenrana vorgerückt war, machte General J. van Swieten den Versuch um zu einem Abkommen mit Wadjo zu gelangen, aber ohne Erfolg. (M. T. H. Perelser, De Bonische Expeditiën. Krijgsgebeurtenissen in 1859 en 1860, II, 1872, p. 175, 273). Thatsächlich konnte dieses Reich daher bis zum Jahre 1888 als unabhängig gelten. Diesen Umstand benutzend waren noch im September desselben Jahres zwei Abenteurer, Namens Th. von Petersen und Smit du Moulin, den Tjenrana stromaufwärts gefahren, um in Tempé angelangt ihre Ueberredungskünste an dem Aru Matowa zu erproben. In Anhetracht der innerpolitischen Verhältnisse von Wadjo musste diese beabsichtigte Gründung schon von vornherein als aussichtslos betrachtet werden. Dem scharfblickenden James Brooke war dies bei einem ähnlichen Versuche im Jahre 1840 sofort klar geworden.

82 m. hohen Gipfel zu erklimmen. Wahrend ich noch mit den Peilungen beschäftigt war, kamen einige Dorfbewohner heran, um sich die Manipulationen anzusehen. Meinem erfindungsreichen Diener Sakiman gab dieser Besuch die erwünschte Gelegenheit sich nach frischen Cocosnüssen zu erkundigen, aber die Leute verstanden uns nicht, bis ich mich der buginesischen Bezeichnung "Kaluku", welche ich gelegentlich aufgefangen hatte, entsann. Bereitwilligst wurden wir hinabgeführt und bald lagen einige der durststillenden Früchte frisch vom Baume gepflückt vor uns. Nicht allein wurde jegliche Bezahlung zurückgewiesen, sondern auch die auf die Bitte eines Jungen vertheilten Cigarren wurden vom dem Aeltesten weggenommen und mir wieder erstattet. Welch ein Gegensatz zu dem Patta Pilaé, der durch seinen Sohn sich täglich Cigarren erbettelte!

Als wir nach Tempé zurückkehrten war der Wochenmarkt noch im vollen Gange. Qualität, wie Quantität der feilgebotenen Produkte waren sehr bescheidener Art. Dagegen fehlte es nicht an einer Gelegenheit die wenigen, mühsam erworbenen Deute wieder los zu werden. Unserer Wohnung gegenüber befand sich nämlich das Spielhaus — charakteristisch genug, ummittelbar neben der Moschee (Taf. II, Fig. 5) gelegen — ein Gebäude, welches sich zu ebener Erde befand und dessen Dach fast bis zum Erdboden niederging. Ein Croupier präsidirte, um das Spiel zu überwachen und zugleich den dem Aru Matowa zukommenden Antheil mittelst eines langen, an dem einen Ende flach zugeschärften Stabes einzuheimsen. Das Jeu bestand in dem Werfen von Münzen. Weitere Einnahmen bezieht der Fürst noch aus dem Opium-, dem Salz- und dem Tabaksmonopol, sowie von den Tanzmädchen. Alle diese Erträge werden für die Hofhaltung verwendet, wenn man von dem Ankauf von Waffen absieht.

Noch an demselben Abend sollten wir einen Begriff von dem im Volke herrschenden Aberglauben erhalten. Kurz nachdem der Mond aufgegangen war, erschien derselbe mit einem Hofe umgeben und unmittelbar darauf ertönte aus sammtlichen Hütten ein ohrenbetäubendes Geklapper, um die heranziehenden bösen Geister zu beschwören. Der Höllenlarm nahm erst ein Ende, nachdem die Scheibe des Mondes sich klar und unverhüllt den Blicken wieder darbot.

Der am folgenden Tage gemachte Versuch den Fluss von Bila stromaufwärts weiter zu verfolgen, musste in Folge eines plötzlichen Fieberanfalles bald eingestellt werden. Auf diese Weise entging mir auch das Vergnügen dem von Frau Weber der jugendlichen Bevölkerung gegebenen Abschiedsfeste mit verlockenden Preisen, beiwohnen zu können.

Rechtzeitig harrten unserer am 2 Iten October eine Anzahl der schmalen, langen Canoes (Lepa-Lepa), welche uns stromabwärts nach Pompanuwa bringen sollten. Wiederum war das Volk herbeigeströmt, dieses Mal aber um unserer Abfahrt beizuwohnen. Das Gepäck war endlich untergebracht. Noch einmal schweift unser Blick über die Menge und dann setzen die Ruderer ein. Nach wenigen Minuten Tembé unseren Blicken entschwunden. Bei Sengkang macht der Minralang eine starke Biegung, indem er sich nach SO. wendet, alsbald folgt Amangsalo. Die Ufer bleiben überall niedrig und bestehen vorwiegend aus einem gelblichen, wenig geschichteten lössartigen Thon. Stellenweise tritt auch der neogene Sandstein zu Tage, in welchen der Fluss sein Bett eingegraben hat. Sie sind besetzt mit kleinen Kampongs, Bananen-, Palmen- und Bambushainen, welche in bunter Abwechslung an uns vorübergleiten. Indessen rückt die Bergkette näher und näher, bis dieselbe dicht hinter dem Kampong Bara von dem Flusse durchbrochen



Maasstab 1:600,000. — Höhe: Länge = 10:1.

Profil durch Süd-Celebes von der Makassar-Strasse bis zum Golf von Boni

wird 1). Der Minralang erlangt hier die verhältnissmässig beträchtliche Breite von etwa 60 m. Am linken Ufer liegt an dieser Stelle der Kampong Tambangan und am gegenüberliegenden erhebt sich etwa 100 m. vom Userrande entsernt der Bulu Surae, mit welchem beginnend die Bergkette sich weiter nach Süden fortsetzt. Von nun ab durchzieht der Strom nur flaches Land und die Steilabsturze der User erreichen die Höhe nur weniger Meter. Dieselben stellen aber besondere Angriffspunkte für die während der Regenzeit mächtig geschwellten und mit besonderer Wucht niedersausenden Wasser dar. Nur zu leicht giebt das lockere Erdreich nach und massenhaft erblickt man Baume, welche halb entwurzelt dastehen, um dem kommenden Westmonsun zum Opfer zu fallen. Was nicht stromabwärts dem Meere zugeführt wird, sammelt sich zu einem flachen Vorlande in den Biegungen des Flusses an, um willkommene Lagerplätze für Wasservögel und Krokodile abzugeben. Den mannigfachen Windungen folgend erreichten wir um die Mittagszeit den sehr ausgedehnten Kampong Lagusi. Ein schattiges Plätzchen am User ward bald gefunden und hier vereinigten sich alle Theilnehmer an dem schnell bereiteten Mahle. Nach einstundiger Pause suchte ein Jeder wieder sein Boot auf und wacker griffen unsere Wadjoresen wieder aus. Hinter dem Kampong Balang treten die Sandsteinschichten noch einmal zu Tage aus, wiederum mit N-S. Streichen, aber mit einem Einfallen nach O. die letzten Reste des östlichen Flügels der Antiklinale. Gegen 2 4 Uhr Nachmittags passiren wir den Kampong Kampira, wo der Fluss abermals eine Krummung macht, von da ab den Namen Tjenrana führt und ab solcher sich später in den Meerbusen von Boni ergiesst. Nach einstündiger weiterer Fahrt kommen die ersten Häuser von Pompanuwa in Sicht und

¹⁾ Nach den obigen Angaben bedarf es keiner eingehenden Auseinandersetzung, un die Vermuthung, welche K. Martin hinsichtlich der Entstehung des Minralang ausspricht (Tijdschr. v. h. Kon. Nederl. Aardr. Gen. (2), VII, 1890, p. 276), zurückzuweisen. Vergeblich schaut man bis zu der Mündung des Tjenrana nach den Korallenriffee aus, in welche durch eine Ausschartung ein Verbindungskanal mit dem Meere herzestellt sein soll. Die Ablagerungen des Beckens von Limbotto ruhen auf Granit und von Tondano-See führt Frenzel Obsidian (Tschermak's Mineralog. u. petrogr. Mitthlg III, 1881, p. 294), Reinwardt Basalt an (Reis naar het oostelijk gedeelte van den ladischen Archipel, Amsterdam 1858, p. 563, 564). Diese Thatsachen sind gleichfalls nicht in Einklang zu bringen mit der von Martin angenommenen ausserordentlich" groesen Anslogie, welche in Bezug auf Lage und Entstehung zwischen den Seen von Tempé und Sidenreng und jenen von Limbotto und Tondano vorhanden seln soll. Die Lagerungverhältnisse der erstgenannten Seen ergeben sich aus dem umstehenden quer durch Sui-Celebes gezogenen Profile.

werden mit Freuden begrüsst. Grosse schwerfallige Handelsprauen liegen am Ufer. Erst am Ausgange des Ortes legen die Boote an. Hier befindet sich ein grosses, stattliches Gebäude, welches die Lehnsfürstin von Boni, in deren Gebiet sich Pompanuwa befindet, vor einem Jahre bei Gelegenheit des Besuches des Gouverneurs, Herrn von Braam Morris, hatte errichten lassen. Trotz der seitdem verflossenen kurzen Zeit hatte der Zahn derselben genügt, um die Treppe zur Hälste zu zerstören, im Uebrigen fanden wir hier aber die beste Unterkunft, welche uns auf der ganzen Reise zu Theil geworden war. Unsere Absicht war, von hier aus über Lantja nach Boni zu reisen, um sodann in dem Hafenort Badjowa den "Sperwer" wieder zu besteigen. Leider war jedoch die Lehnsfürstin von unserer Ankunft nicht unterrichtet worden und als wir den Dorfhauptling citirten, kam statt dessen sein Sohn, welcher mittheilte, dass der grösste Theil der männlichen Bevölkerung nach Boni entboten worden sei, um dort Herrendienste zu leisten. Die Furstin war nämlich auf den Gedanken gekommen, einen Kanal von Boni nach Radjowa graben zu lassen, um den erstgenannten Ort zu dem Range einer Seestadt zu erheben. Aussicht auf Erfolg hat dieses Unternehmen wohl nur unter der Voraussetzung, dass das Wasser sich dazu bequemen wird ausnahmsweise aufwarts zu fliessen. Aus den Verhandlungen, bei denen der uns begleitende Herr L. Brugman als Dolmetsch fungirte, ergab sich, dass in dem Orte weder die genugende Anzahl Pferde, noch Lastträger vorhanden waren, um die Weiterreise über Land unternehmen zu können. Die den Sohn des Kamponghäuptlings begleitenden älteren Männer erklärten zudem, dass Pompanuwa nicht noch mehr von Mannschaften entblösst werden durfe, da es sonst Raubereien und Ueberfallen ausgesetzt sei. Der einzige uns bleibende Ausweg war ein Schiff zu chartern und damit den Tjenrana stromabwarts bis nahe seiner Mundung nach Palima zu fahren. Nach langwierigen Unterhandlungen glückte es endlich im Laufe des folgenden Tages mit dem Besitzer ein Uebereinkomnen zu treffen und Abends verkundete das weithin hallende Gong der Gemeinde die bevorstehende Abfahrt an. Die Umgegend von Pompanuwa ist flach und dient hauptsächlich zum Reisbau, wozu der fette, schwere Thon sehr geeignet erscheint. Im Suden begrenzt die Felder ein ausgedehnter Wald, hinter welchem in blauer Ferne die Berge Pepe, Palange und Bataru, welche auf dem Wege nach Lantja liegen sollen, auftauchen.

In der Frühe des 23ten October waren wir rechtzeitig reisesertig, die auf 5 Uhr bestellte Schiffsmannschaft liess selbstverständlich noch auf sich warten. Nur ein Mann war als Wächter an Bord geblieben und bekundete

seine Anwesenheit dadurch, dass er von Zeit zu Zeit auf das Gong schlug. Schliesslich musste in das Dorf geschickt werden, wo der Djuragan noch friedlich in seinem Heim schlummerte, während seine Leute mit den Vorbereitungen zu dem Morgenmahle beschäftigt waren. Endlich gegen 18 Uhr war Alles soweit, dass es losgehen konnte. Schon die ersten Ruderschläge eröffneten eine glänzende Perspektive auf den weiteren Verlauf der Fahrt. Das schwerfallige und plumpe Fahrzeug war mit Reis derart beladen, dass in dem Schiffsraum höchstens einige Inländer in hockender Lage Unterkunft finden konnten, und sonach war fast die ganze Reisegesellschaft auf das zu beiden Seiten schräge abfallende Dach angewiesen. In Folge dieser übermässigen Decklast war zudem der Schwerpunkt so weit nach oben verlegt, dass die geringste Ortsveranderung einer Person ein starkes Schwanken des Kastens verursachte. Ein bequemer Sitzplatz war für Niemanden vorhanden und ebensowenig trugen die auf unsere Häupter niedergesandten Sonnenstrahlen zur Verannehmlichung der Lage bei.

So glitt das träge Fahrzeug, von noch trägeren Menschen fortbewegt, langsam, sehr langsam stromabwärts. Die Ruder waren schon langst weggelegt und statt ihrer lange Bambusstangen hervorgeholt worden, mit deren Hulfe, stets vom Ufer abstossend, der Kahn in Bewegung gehalten wurde. Der Tjenrana besitzt in seinem unteren Laufe eine durchschnittliche Breite von 50 m. Seine wenig hohen Ufer fallen steil ab und erfreuen sich einer reichen Baumvegetation. Neben Bananen und Kapokbaumen (cotton-tree), stellen sich vor allen Dingen zahlreiche Mangobaume ein, deren reichlich mit unreisen Früchten beladene Zweige den Usersaum beschatten. Das Schiffsvolk gönnt sich das kindliche Vergnügen mit den Ruderstangen diese Früchte abzuschlagen, um jedes harmlose Huhn, welches sich irgendwo blicken lässt, damit zu bombardiren. Eine Reik von Kampongs, wir Uelado, Bola, Terungang, Matepawé, Daré zieben an uns vorüber, bis wir in der Nähe von Solo 1) Mittagsrast halten. Wir waren eben im Begriff durch diese Thatigkeit einige Abwechslung in das Einerlei des Tages zu bringen, als eine leere Lepa-Lepa vorbeifubt. Dieselbe wurde sofort angehalten, worauf Weber, der seit dem Verlassen von Tempé vom Fieber geplagt wurde, dieselbe mit seiner Gemahlm bestieg, um schneller ans Ziel zu gelangen. Wir folgen langsam nach.

Mit gleich bleibender Scenerie werden die Kampongs Tjilalang, Till.
Palae passirt, bis in den späteren Nachmittagsstunden zunächst der im Soden

¹⁾ Von hier ab gehört auch das linke Ufer des Tjenrana zu Boni.

isolirt sich erhebende Berg Mampu und weiterhin der mehrgipflige Rükken des Saelon auftaucht. Als die Sonne tief am Horizonte steht, greifen die Leute wieder zu den Rudern. Ein wunderbar linder Abend breitet sich über die Gefilde aus und vergessen ist der sonnendurchglühte Tag, vergessen der Verdruss über so mancherlei Widerwärtigkeiten. Wo ein baumfreies Fleckchen am Ufer einen freien Ausblick gestattet, sieht man in der hereinbrechenden Nacht Feuer auflodern. Es sind die Reisfelder, deren Stoppeln von den Flammen verzehrt werden, in der baldigen Erwartung des regenspendenden Westmonsuns, der auf ihnen wieder neue Aehren entstehen heisst. Die ab und zu auftauchenden Lichter weisen die Stätten an, wo friedliche und bescheidene Menschen die Summe der geringfügigen Tageserlebnisse ziehen - in ihren Augen selbst vielleicht Erlebnisse von hervorragender Bedeutung, in Wirklichkeit einem Tröpfchen gleichend, das sang- und klanglos ins Meer verrinnt. - Geräuschlos durchschneidet der Kiel des Schiffes die spiegelglatte Fluth des Tjenrana, gelenkt von den Hand des kundigen Steuermannes.

Endlich des Nachts um halb zwölf hält die Prau an - wir sind in Palina. Es gelingt noch das Haus zu erkunden, in welchem unsere Reisegenossen untergebracht worden sind und welches uns gleichfalls seine gastliche Pforte öffnet. Palima liegt mitten im Delta, welches der Tjenrana gebildet hat und zwar an einem der Hauptarme desselben. Der Boden ist daher morastig und ungesund, die Bevölkerung zudem auf den Genuss von Brackwasser angewiesen. Als Handelsplatz ist der Ort jedoch wichtig, wovon auch die zahlreichen Schiffe, welche hier lagen einen deutlichen Beweis lieferten. Unsere Hauptsorge war sobald als möglich weiter zu kommen und der ganze Tag ging mit Verhandlungen hin, welche mit dem Schabandar (bug. Sabannara) geführt wurden. An Schiffen zur Weiterbeförderung war selbstverständlich kein Mangel, wohl aber an den nöthigen Ruderern. Endlich war auch diese Frage erledigt und so wurden noch bei Tageslicht die beiden, riesig langen Canoes mit dem Gepäck beladen, während die Abfahrt auf Mitternacht angesetzt war. In der Voraussicht einer schlaflosen Nacht hatten wir uns nach eingenommenem Abendessen noch etwas niedergelegt, aber die Rechnung ohne die Hunde gemacht, welche sich um die durch die weit klaffenden Löcher des Fussbodens nach unten beförderten Speisereste zankten. Diese Thiere werden von alle Völkern des Archipels schlecht behandelt und leiden ausnahmslos an chronischem Hunger.

Gegen 12 Uhr rollten wir unsere Matratzen auf und ward sodann der Weg nach der Absahrtsstelle angetreten, wo selbstverständlich noch kein

Mensch anwesend war. Nachdem Mann für Mann den Armen des sie fest umschlungen haltenden Schlafgottes entwunden worden war, konnten sich die Boote kurz vor 1 Uhr des Nachts in Bewegung setzen. Jedes der Lepa-Lepa's war mit 8 Ruderern bemannt, welche eine rühmenswerthe Ausdauer entwickelten, denn der 22 Kilometer lange Abstand bis Badjowa wurde in 84 Stunden zurückgelegt. Zunächst ging die Fahrt durch die sich durch das Delta windenden Kanale, worauf das offene Meer, d. h. der Busen von Boni, erreicht wurde. Mit dem Anbruch des Tages wurde die See bewegter und die Wellen schlugen in die Boote. Die wackeren Ruderer holten nun aber erst recht aus und bald nach 8 Uhr Morgens lagen wir vor Badjowa, dem Hasen des Lehnssurstenthum Bom Es war gerade Ebbezeit und so mussten wir über die den Füssen sich in so empfindlicher Weise bemerkbar machenden Riffe an das über i Km. entfernte Ufer wandern. Der Mata-Mata 1) des Ortes bot uns eine gastliche Stätte und räumte sosort sein bestes Zimmer ein. Wir befanden uns allerdings in einem ziemlich reducirten Zustande. Weder für die Wasche. noch für die Reinhaltung des eigenen Leibes hatte seit den Tagen von Tempé das Nothige gethan werden können und die unentbehrlichen Lebensmittel waren ungefahr bis auf eine Blechbüchse mit Erbsensuppe msammengeschrumpft. Programmmässig war der "Sperwer" erst am folgenden Tage zu erwarten, so dass es eine besonders freudige Ueberraschung war, als in den Mittagsstunden plotzlich der Ruf: "kapal api" laut wurde. Es zeigte sich wirklich am Horizonte eine näher kommende Rauchwolke und bald waren die Umrisse des ersehnten Dampfers deutlich zu erkennen. Der vielen Untiefen wegen liess derselbe weit dranssen den Anker fallen, aber noch im Laufe des Nachmittages befördert uns eine Prau sammt Hab' und Gut an Bord, wo wir uns wohl ausgehoben wussten.

In der Frühe des kommenden Tages (26 October) dampsten wir von Badjowa ab und erreichten nach sechsstündiger Fahrt Balangnipa. Trottdem das Schiff nicht allzuweit von der Küste abhielt, konnte von der
letzteren, des dieser Jahreszeit eigenthümlichen Seerauches wegen, nur wenig gesehen werden. Nachmittags begab ich mich mit dem Capitan Herm
W. C. Meyer in einer Jolle nach Balangnipa 1, wo sich der Gouverneus

¹⁾ Wörtlich: Auge-Auge, was eigentlich Spion bedeutet, in diesem Falle aber Stellvertreter des Hasenmeisters (Sabannara).

²⁾ Bis zum 30 Januar 1860 gehörte Balangnipa zu Boni. Seit diesem Tage steht e ebenso wie Kadjang unter direkter Verwaltung und bildet den nördlichsten Posten zu Golf von Boni.

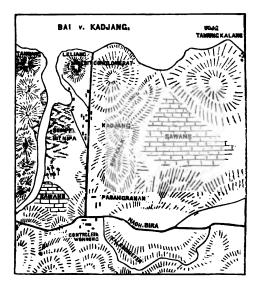
lerr D. F. van Braam Morris, auf einer Dienstreise begriffen, aufhielt. lachdem die unvermeidliche Barre glücklich passirt worden war, fuhren ir bald darauf in den Tangka-Fluss ein, welcher sich in starken Krümaungen durch einen mit Nipa-Palmen (Nipa fructicans, Wurmbr.) bedecken Sumpf hindurchwindet. Erst 3 Km. stromauswarts stellen sich die 1sten Häuser ein, im Fluss liegen zahlreiche Prauen, welche hauptachlich den Handelsverkehr mit Makassar einerseits, mit Boni und Wadjo anderseits vermitteln. An einer weiteren Biegung folgen Wohnungen von Beamten und sodann das Amtsgebäude des Assistent-Residenen, vor welchem gelandet wird. Hier erfuhren wir, dass der Gouverneur n der 3 Km. landeinwärts sich befindenden Privat-Wohnung des Assisent-Residenten verweilte und setzten unseren Weg dahin fort, nachdem vir zuvor dem in der Ebene liegenden, von hohen Mauern umgebenen Fort inseren Besuch abgestattet hatten. Nach einem halbstündigem Marsche natten wir unser Ziel erreicht und vernahmen alsbald durch Herrn van Braam Morris, dass die Weiterfahrt am 28ten stattzufinden habe. In Folge dessen war die Gelegenheit geboten noch Einiges von der Umgeoung kennen zu lernen. So begaben sich Weber nebst Gemahlin und ch uns am folgenden Morgen von Bord des Dampfers aus nach Balangnipa, wo der Militararzt Herr Dr. Fock so liebenswürdig war uns mit den aothigen Anweisungen zu versehen. Ich zog hierauf mit einem kleinen, mir als Führer zugetheilten Burschen durch die Flussniederung und später in die Hugel, welche die Umgebung des Kampong Tangka bilden. Dieselben erheben sich 30-50 m. über der Ebene und setzen sich aus groben Andesit-Conglomeraten zusammen, deren Cement bereits stark zersetzt und bröckelig geworden ist. An den Abhängen und theilweise auch im Boden fanden sich zahlreiche Muscheln, welche jedoch sammtlich Arten angehören, die noch gegenwärtig im Meere leben. Wir trasen nachher im Fort in der Wohnung des Herrn Dr. Fock wieder zusammen und nahmen bei demselben die Reistafel ein. Nachmittags kehrten wir wieder an Bord des "Sperwer" zurück.

in der Frühe des 28ten October langte Herr van Braam Morris auf dem Schiffe an, welches alsbald seine Reise südwärts fortsetzte und nach 3-stündiger Fahrt vor Kadjang anlegte. Unter dem vorschriftsmässigen Salut von 13 Kanonenschüssen, welche für den Gouverneur abgegeben wurden, stiess die Schaluppe vom Dampfer ab, während die empfangbereite Bevölkerung unter Führung ihrer Hauptlinge am Strande Stellung genommen hatte. Die unmittelbar dahinter schroff ansteigenden Hügel gaben den wirkungsvollen Hintergrund zu dem farbenreichen Bilde ab. Nach-

dem das Meeresuser mit Hulse einiger, in weiser Voraussicht der kommenden Dinge bereit gehaltener Tragstuhle, trockenen Fusses erreicht worden war, sand zunächst die Begrüssung seitens des Controleurs Herm J. F. Hoedt statt, worauf sich der Zug in Bewegung setzte. Voran schritt eine Abtheilung Lanzenträger, deren Lanzen enthüllt und ausser den Haarbüschen noch mit kleinen Fähnchen verziert waren. Hierauf solgte der Gouverneur im Schatten des ihm zur Seite getragenen, vergoldeten Sonnenschirmes, dem sich die übrige Begleitung anschloss. Den Beschluss bildete die männliche Bevölkerung unter Führung ihrer Häuptlinge. Ab der Zug an die Wohnung des Controleurs gelangt war, löste sich derselbe auf, und alsbald wurde trat unter dem Vorsitze des Gouverneus eine Versammlung der Häuptlinge zusammen. Ich begab mich auf der schnurgraden Strasse nach dem Strande zurück, wo der Hügel Leliang bereits bei unserer Ankunst meine Ausmerksamkeit auf sich gelenkt hatte

In der Umgegend von Kadjang ist die Kuste reich an Buchten, welche von wenig hohen Berge eingerahmt werden, weiter nach Suden bis zur Südostspitze dieser Halbinsel von Celebes fortschreitend nehmen dieselben an Höhe und Schroffheit zu. Von der Kaajang-Bai gehen noch eine Reihe von Einbuchtungen aus, welche vom Strande aus betrachtet, dem Auge meist durch die coulissenartig sich vorschiebenden Felsen en:zogen werden. Ein längerer, schmaler Meeresarm drängt sich unmittelbar westlich vom Hugel Leliang in das Land ein. Am jenseitigen Ufer erhebt sich der kaum 100 m. hohe Berg Tambang, in dessen Fortsetzung nach S. sich weitere Hügel anschliessen, welche den Meeresam begrenzen. Der schmale, sandige Strand an unserem Landungsplatze ist mit Muscheln, sowie zahlreichen Andesitresp. Basaltgeröllen übersact Rechts vom Zugange nach dem Orte befindet sich der Leliang, an des sen Basis ein grobes Andesit-Conglomerat in vorzuglicher Weise aufgeschlossen ist. Die Meeresfluthen haben den Fels unterwaschen und die herumliegenden Gerölle bilden die Belegstucke für das absolvirte Arbeits pensum. Weit hängen die Felsen stellenweise über oder es sind dort, wo der Anprall der Wogen sich auf bestimmte Punkte concentrirte, höhlenartige Ausnagungen entstanden. Das Conglomerat ist deutlich geschichtet. Die Schichten streichen in N 60° W. und fallen unter einem Winkel von 25° nach NO. ein. Geht man in westlicher Richtung um den Berg herum, so beobachtet man, dass das Gestein allmählich in ein sandigkalkiges Conglomerat, welches zugleich Kalksteingerölle einschliesst, übergeht. Nach oben schliesst der Hügel mit einer Decke gelben Lebmes ab. Der Kampong nimmt den grössten Theil der sumpfigen, mit

Nipa-Palmen bedeckten Niederung, zwischen der Strasse und dem Mee-



resarm gelegen, ein. Die östlich von der Strasse anstehenden Gesteinsmassen gehören Kalksteinbildungen an. Ein altere Ablagerung besteht aus schwebenden Schichten eines sandigen, dunnplattigen Kalkschiefers, welcher überlagert wird von einem Korallenkalkstein, der auch in mächtigen Blöcken an den Gehängen hervorragt und zuweilen Basaltgerölle umschliesst.

Nach gethaner Arbeit fanden wir uns Alle wieder unter dem gastlichen Dache der Familie Hoedt zusammen. Wohl wenige Menschen vermögen sich von einem solchen, in der Einsamkeit sich abspinnenden Dasein eine rechte Vorstellung zu machen. Und doch ist es das Loos zahlreicher Beamten die besten Jahre ihres Lebens in der fast ausschliesslichen Umgebung einer — dazu oft recht indolenten — eingeborenen Bevölkerung zuzubringen. Wie ein solches Dasein aber einige Abwechselung zu bieten vermag, zeigte das Beispiel von Frau Hoedt, die sich einen kleinen Thiergarten angelegt hatte. Es war ein erfreuliches Bild die Hirsche, Affen, Ziegen, Hunde, Tauben nebst den unzähligen Hühnern in fröhlicher Eintracht mit einander leben und verkehren zu sehen.

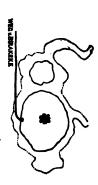
In den Nachmittagsstunden unternahmen wir noch einen Spaziergang in die Hügel, welche sich hinter dem Orte ausdehnen, wo wiederum die obenerwähnten Kalkschiefer in gleichen Lagerungsverhältnissen angetroffen wurden. Nach dem Abendessen wurde der Rückmarsch angetreten.

Derselbe Aufzug, welcher beim Empfang des Gouverneurs gegenwärtig war, hatte sich auch bei der Verabschiedung wieder eingestellt. Die Leutchen waren aber so unvorsichtig gewesen ihre Fackeln zu früh anzuzünden, so dass sie bereits abgebrannt waren, ehe sich der Zug überhaupt in Bewegung gesetzt hatte. Schliesslich wurden noch ein Paar Stalllaternen geholt, welche dieselben Dienste leisteten, freilich aber auch einen weniger effektvollen Eindruck hervorriefen.

Des Nachts um 3 Uhr hörte man bereits die Ankerkette rasseln und bald darauf verliess der "Sperwer" die Kadjang-Bucht, um weiter sudwarts zu dampsen. Nach wenigen Stunden besand sich der Dampser vor Bira, wo wir zu landen gedachten, um der in der Nähe befindlichen Todtenhöhle einen Besuch abzustatten. Die starke, gegen die Felsenküste wüthende Brandung liess ein weiteres Nahen nicht räthlich erscheinen. Es wurde nunmehr Ordre gegeben, um die Sudostecke von Celebes (Kap Lassowe) herumzusahren und die Landung von der Bira-Strasse aus zu versuchen. Hier waren die Verhaltnisse wirklich gunstiger und um 81 Uhr landeten wir bereits bei dem Kampong Kolang. Der Strand besteht aus einem weissen Korallensande, während unmittelbar dahinter die nackten, schroff abfallenden Kalksteinselsen emporragen. Da sich kein des Weges Kundiger in unserer Gesellschaft befand, so gab ein alter Mann, bei dem Erkundigungen eingezogen wurden, einen Führer mit. Wir wanderten zunächst in östlicher Richtung hart am Strande weiter bis der Kampong Tanettan erreicht worden war. Von hier wurde nach NO. abgebogen und führte der Weg nunmehr über eine Ebene, Pomponie genannt, die aus Korallenkalk besteht. Dieselbe ist nur schwach bewachsen und der nackte Kalkfels ragt überall in Gestalt scharfer Spitzen und Zacken hervor. Zur Linken erhebt sich der Kalksteinberg Kalorang Tanaja. Endlich wendet sich der Pfad nach Norden und nach einem, eine gute halbe Stunde währenden Marsche befinden wir uns wiederum am Golf von Boni. Während wir hier den langs des Strandes führenden Weg verfolgen, erhebt sich zur Linken eine schroff abstürzende Kalksteinwand, in deren grottenartigen Aushöhlungen, hoch über dem Fluthstande liegend, Häuser hineingebaut sind. Auch doppelt unterwaschene Felsen lassen sich stellenweise auf das Deutlichste erkennen und bekunden eine periodenweise negative Niveauverschiebung. Etwas nach 9 Uhr des Vormittags langen wir an dem Kampong Panraluhu an, wo die Strandfläche etwas breiter wird und so Gelegenheit zu einer Anpflanzung von Cocospalmen gegeben hat, die ihrerseits einen höchst willkommenen Laberunk zu spenden im Staude waren. Nach 5 Minuten weiteren Wanderns

klettern wir, nach N 80° W. uns wendend, bergan, treffen dort in 32 m. Höhe unterwaschene Felsen und erreichen auf der Höhe angelangt, weiter fortschreitend um 1 10 Uhr den Kampong Birakéké. Kurz zuvor war uns der Regent von Bira, sammt seinem Vertreter - beide im höchsten Staate - entgegen gekommen, um den Gouverneur zu begrüssen. In ihrer Begleitung befand sich viel Volk, sowie mit Lanzen bewaffnete Krieger. Ohne weiteren Ausenthalt marschirten wir durch Birakeke und standen nach einer weiteren Viertelstunde vor dem Zugange zu der kleinen Höhle Kalepé 1). Die Oeffnung ist von ovaler Form, etwa 5 m. lang und 2 m. breit; an dem einem Ende derselben befindet sich ein halb in die Höhle versunkener Waringinbaum. Mit Hulse der in die Felsen versenkten Baumwurzeln konnten wir in das etwa 8 m. tiefe Loch hinabklettern. Unten erweitert sich die Höhle beträchtlich und an dem auf diese Weise gebildeten Gewölbe hangen Tropfsteingebilde, theils kammförmige Gestalten, theils plumpe Zapfen darstellend, herab. An einer Stelle lagen einige wenige Schädel und ein Paar Wasserbehälter (Gendi) umher. Engelhard ist der Meinung, dass dieses Loch als Verliess benutzt worden sei, doch klingt dies recht unwahrscheinlich, da es hierzulande weitaus bequemere Mittel giebt, um Jemanden aus dem Wege zu raumen. Ferner ist die Form der gefundenen Gendi's eine andere, als bei der gegenwärtigen Bevölkerung gebräuchlich ist. Vielmehr scheinen dieselben den Todten als Viaticum mitgegeben worden zu sein. — Weitaus grösser ist die nur wenige Minuten entfernt liegende Höhle Liyang Tattara (Lintattara). Zwei weite Oeffnungen stellen die Verbindungen mit

der Aussenwelt her und durch die grössere derselben führt eine ad hoc verfertigte, bequeme Leiter auf den Boden. Die beistehende Skizze sucht den Grundriss der Höhle darzustellen. Auf dem Boden erweitern sich beide Oeffnungen, so dass Gewölbe entstehen von denen wieder Gänge auslaufen. Nur in einigen Nischen sind noch einzelne, allerdings geöffnete Särge vorhanden. Zu vielen Hunderten liegen dagegen lose Schädel umher, daneben finden sich auch Knochenreste von Hirschen und Schweinen, welche wohl von Thieren stammen, die abgesturzt sind und inmitten der grau-



¹⁾ Es ist dies zweifellos dieselbe Höhle, welche H. E. D. Engelhard Sépé nennt. (Bijdragen tot de Taal-, Land- en Volkenk. (4), VIII, 1884, p. 879). Welche Bezeichnung die richtige ist, vermag ich nicht zu entscheiden.

sigen Umgebung einen jämmerlichen Tod fanden. Sehr zahlreich sind auch die Schalen abgestorbener Landmollusken. Trotzdem die Höhle wiederholt ausgebeutet worden ist, so von Engelhard 1), Tromp 2) u. A., finden sich zahlreiche Fragmente von chinesischen Porzellantellern geringer Gute, Gendi's u. s. w. darin vor. Ein geheimnissvoller Schleier breitet sich über die Herkunft dieser menschlichen Gebeine aus. Weber erkannte schon während unserer Anwesenheit, dass die Schadel gewöhnlichen Malayen angehören. Von der umwohnenden Bevölkerung wurden diese Reste jedoch nicht als diejenigen ihrer Voreltern anerkannt, sie bezeugte denselben im Gegentheil die grösstmögliche Theilnahmslosigkeit. Naheliegend wäre die Annahme, dass Seerauber, Fluchtlinge u. s. w. hier ein zeitweiliges Unterkommen gesucht haben, worauf die Gerathe hindeuten. Die Lage ist für einen derartigen Zweck auch eine besonders gunstige, da die Höhle sowohl von der Saleyer-Strasse, als von dem Busen von Boni aus leicht zu erreichen ist. Die in Särge geborgenen und sonst herumliegenden menschlichen Reste haben aber sicher Nichts damit zu thun, denn die Seerauber werden schwerlich die Mittel besessen haben die Leichen ihrer Genossen bis zu dem Erreichen dieser Stätte zu konserviren. Wahrscheinlich stammen sie noch aus vormohammedanischer Zeit

Der Rückweg wurde auf einem Pfade angetreten, welcher längs des bewaldeten östlichen Abhanges des Kalorang Tanaja 3) direkt nach dem Südstrande führt. Nach einstündigem, ununterbrochenem Marsche über den zackigen, löcherigen Kalkstein 4), der stets seine Spuren an den Fusssohlen zurücklässt, erreichten wir wieder den Kampong Kolang. An Bord angelangt, ging der "Sperwer" sofort wieder unter Dampf, worauf wir im Laufe des Nachmittags auf der Rhede von Bonthain vor Anker gingen. Von dem berühmten Pik von Bonthain hatten wir, des nebligen Wetters wegen, während der ganzen Fahrt keinen einzigen Blick m

¹⁾ Bijdragen tot de Taal-, Land- en Volkenk. (4), VIII, 1884, p. 375.

²⁾ Notulen v. d. Algem. en Bestuursverg. van het Batav. Gen. v. K. en W. XX. 1882, p. 18.

³⁾ Wohl identisch mit G. Djangko resp. Puwa Djanggo.

⁴⁾ Es ist dies derselbe Riffkalk, welcher bei Kadjang gefunden wurde und den Martin als quartär bezeichnet. (Tijdschr. v. h. Kon. Nederl. Aardrijksk. Genootsch. (2), VII, 1890, p. 265). Diese Ablagerungen stimmen aber wieder genau mit den von S. Müller von Beton erwähnten Riffkalken überein (Reizen en onderzoekingen in den Indischen Archipel, Amsterdam 1857, II, p. 13), welche Martin als tertiär und zwar als fragliches Alt-Miocan bezeichnet. (Beiträge zur Geologie von Ost-Asien, Bd I, 1881—83, p. 158. 178). Die letztere Annahme ist jedoch schwerlich richtig.

erhaschen vermocht. Da der "Sperwer" nach Ablauf einiger Tage wiederum nach Bonthain kommen musste, so machten wir von der uns durch Herrn van Braam Morris freundlichst angebotenen Gelegenheit Gebrauch, um in der Zwischenzeit das hoch am Sudwestabfall des Lompo-Battang gelegene Loka (Lokka) zu besuchen. Zunächst fanden wir in der Wohnung des Assistent-Residenten, Herrn H. F. Verhelst, die gastfreundlichste Aufnahme, wie wir uns überhaupt der grössten Fürsorge des genannten Herrn zu ersreuen hatten. Bonthain (richtiger Bantaeng) ist der Hauptort der Sud-Distrikte von Celebes und dehnt sich längs des schmalen Küstensaumes aus 1). Weiter nach Osten wird derselbe bald breiter und bietet Gelegenheit zu einem ausgedehnten Reisbau. Berühmt sind die Kartoffeln, welche selbst bis nach Timor versandt werden. Auch der Weinstock gedeiht, dagegen sind die angeblichen Erdbeeren, welche besonders von Loka heruntergebracht werden, nur die Früchte von Rubus fraxinifolius, Poir., wie Teyssmann berichtet 2). In der Nahe von Bonthain giebt es auch eine warme Quelle; sie befindet sich im W. des Ortes nicht weit von der Landstrasse entfernt, wo sie aus dem Basaltselsen hervorquillt. Die Temperatur des Wassers wurde zu 32° C. gemessen, während die der umgebenden Luft 28,5° C. betrug.

Am Vormittage des 31sten October brachen wir nach Loka auf, nachdem Tags zuvor der daselbst befindliche Pasanggrahan in Ordnung gebracht worden war. Der Weg führt zunächst auf der Landstrasse entlang, wendet aber gleich nach Ueberschreiten der über den Fluss von Bonthain gebauten Brücke nach Norden, worauf sofort der Anstieg beginnt. Die gut gehaltene Strasse, welche direkt nach dem 1150 m. hoch gelegenen und 7 Km. von Bonthain entsernten Loka führt, ist ziemlich belebt. Zum ersten Male bemerken wir wieder den von Java her bekannten Landesbrauch, dass Berittene beim Begegnen eines "orang blanda" vom Pferde steigen und dasselbe am Zugel vorbeiführen, während die Fussgänger zur Seite in den Graben treten. Die zahlreichen Lastpferde, welche bergabwarts ziehen, mussen es sich sogar gefallen lassen seitwarts in die Busche getrieben zu werden. Wiederholt finden sich Lavastrome mit Tuffschichten abwechselnd, am Wege aufgeschlossen. Soweit die ausserordentlich trübe Atmosphäre eine Aussicht gestattete, liessen sich kleine, den Abhängen aufgesetzte Vulkankegel erkennen. Der erste

¹⁾ Eine vortreffliche Beschreibung von Bonthain hat W. M. Donselaar geliefert. (Bijdr.

t. d. Taal-, Land- en Volkenk. (1), III, 1855, p. 163).

²⁾ Nat. Tijdschr. v. Ned. Indië XXXVIII, 1879, p. 93.

grössere Kampong heisst Pandan-Pandan, höher hinauf wird mittelst einer grossen Bambusbrücke der Bach Sinowa überschritten. Ein treuer Begleiter zu Seiten des Weges ist der Kemiri-Baum (Aleurites triloba, Forst), bis sich vor Loke Kaffeplantagen einstellen. Nach fast 3 stündigem Ritte hatten wir den Pasanggrahan (hier Baruga genannt), ein einfaches, aus Bambus verfertigtes, aber auf zweckmassige Weise eingerichtetes Gebaude erreicht. Der Garten, welcher denselben umgiebt, prangte im Schmuck der schönsten Rosen und wird von Kaffeanpflanzungen theilweise unschlossen. Frei schweift jedoch der Blick über die plumpe Gipfelmasse des Lompo-Battang (Dickbauck) 1), welche aus einer Atrio-ähnlichen Hochflache emporsteigt, die mit Klüften und Schluchten netzförmig durchw gen erscheint. Die einzelnen hervorragenden Gipsel werden mit verschiedenen Namen belegt. Der höchsten einer ist der eigentliche Lompo-Battang, sodann wurden mir genannt der Wawe oder Bawe Karaeng, sowie der Banv Kangpaliang. Oestlich und südöstlich vom Pasanggrahan steigen hinter den Kaffeanpflanzungsn einzelne Kuppen auf, während im N-W. durch eine tiefe Schlucht getrennt sich der Rücken des Darikon-Mas (?) befindet.

Die wenigen in Loka zur Verfügung stehenden Tage wurden zu Ausfügen in die Umgebung, die überall Spuren vulkanischer Thatigkeit zur Schau tragt, benutzt. Eine der deutlichsten Kraterbildungen stellt der als Gunung Loka 1) bezeichnete Berg dar. Der Weg dahin führt zunschst in NO.-Richtung durch Kaffegärten, welche arg vernachlässigt aussehen. Der Boden ist mit Gestrüpp, Schlinggewächsen und Unkraut bedeckt, die Baume selbst fast ganz entblättert, so dass man sich über de verhaltnissmässig gute Ergebniss der Ernten verwundern muss. Nach dem ich 20 Minuten lang dem sich in mannigfachen Windungen de hinziehenden Pfade gefolgt war, wurde in S 70° O. direkt auf den Berg zugesteuert. Am Fusse desselben hört der Kaffe auf, dagegen finden sich hier, wie auch weiter am Abhange massenhafte Lavablöcke, Schlacken. Bomben, sowie auch Brocken von Hornblende-Andesit. Dazwischen gedeiht nur Alang-Alang, sowie eine Pteris-Art. Nach einer weiteren haben Stunde gelangten wir an einen kleinen nach NW. geöffneten Sei

¹⁾ Zuerst und swar von Loka aus bestiegen durch Sir James Brooke im Decembe 1839. Gegenwärtig findet die Besteigung wohl ausschliesslich vom NO-Abfall, us Bikero aus, statt. H. Zollinger äussert einigen Zweifel, ob Brooke wirklich den Giphierklommen habe (Verhdl. Batav. Gen. v. K. en W. XXIII, 1850, p. 8). Auch swurde gesagt, dass es unmöglich sei denselben von Loka aus zu erreichen.

²⁾ Matthes nennt denselben "Doodkist" (Jaarbockje Celebes, 1865, Makassar, p. 117)

tenkrater. Unterhalb desselben befindet sich ein kleiner Hügel und jenseits des letztgenannten gahnt eine tiefe Schlucht, durch welche sich ein Lavastrom ergossen hat. Wir kletterten in den mit dichtem Gestrupp und zum Theil hohen Baumen besetzten kleinen, sehr unvollständig erhaltenen Krater hinein und erreichten von hier aus unter grossen Anstrengungen den sehr steilen Rand des Hauptkraters. Oben stehend sieht man in ein tiefes, nach Süden sich erstreckendes bewaldetes Kesselthal, den eigentlichen Krater. Der obere Kraterrand ist mit riesigen Lavabrocken bepflastert und stürzt in seinem nordöstlichen Theile in einer Höhe von etwa 120 m. jah in die dem Lompo-Battang vorliegende Ebene ab. Wir gingen bis zu dem Punkte zurück, wo wir hinaufgestiegen waren, lenkten nunmehr aber unsere Schritte in die Tiese des Hauptkraters, welcher sich nach Süden öffnet. Verschiedene gefällte Bäume lieferten den Beweis, dass auch hier die Ausschlachtung des Waldbestandes munter im Gange war. Auf dem Boden des Kraters fanden sich neben anderen Auswurfsprodukten schöne, regelmässig gebildete Bomben und Lavathranen. Im südlichen Theile ist die Kraterumwallung wesentlich niedriger. Sie konnte bequem überschritten werden und auf einem in SW.-Richtung führenden Pfade gelangten wir nach dem Pasanggrahan zurnek.

Von der ausserordentlich grossen Anzahl Schluchten, die sich in den Leib des Gebirgskörpers eingefressen haben, gab die Wanderung nach dem kleinen Krater Kanruta einen Beweis. Der Weg führte in nordöstlicher Richtung vom Pasanggrahan aus zunächst durch Kaffegärten, bis man nach & stündigem Marsche an eine tiefe, weite Kluft gelangte, deren Abhange mit durrem Grase und einigen Farnen bewachsen waren. Ein schmaler Pfad führte im Zickzack nach dem Grunde, in welchem ein kleiner Bach rieselte und dessen Bett mit massenhaften Basaltgeröllen angefullt war. Durftiges Baumgewächs fristete in der Nähe desselben sein Dasein. Nachdem die jenseitige Höhe erklettert war, that sich nach 5 Minuten weiteren Wanders ein neuer Abgrund auf. Kaum war auch dieser glücklich bezwungen, als sich nach dem Erreichen des gegenüberliegenden Abhanges aufs Neue ein Blick in die gahnende Tiefe eröffnete. Ohne Weg und Steg ging es hinunter und wieder hinauf. Keuchend oben angelangt, befanden wir uns auf einem schmalen Grate. Auch hier blieb nichts Anderes übrig, als in die sich abermals austhuende Klust hinabzuklettern. Es war, als ob wir aus diesem Labyrinth von Schluchten nicht herausfinden sollten, denn kaum war die jenseitige Höhe erreicht, als wir abermals auf einem Felsgrate standen. Es war der letzte Schlund, in

welchen wir hinabsteigen mussten. Eine gegenüber am Abhange befindliche Hutte, inmitten eines Bananengartchens stehend, wurde links liegen gelassen und weiter nördlich eine mit mageren Kaffebaumen besetzte Seitenschlucht erklommen. Auf der erreichten Höhe weiter fortschreitend, kommen wir alsbald an einem inländischen Begräbnissplatze vorbei und stehen bald darauf am Fusse des Kanruta, dessen Krater sich nach einer in S 40° W. verlaufenden Schlucht öffnet. Ein einsam stehender Baum krönt seinen oberen Rand. Hinter ihm befindet sich die dem Lompo-Battang vorliegende Ebene. — Bei dem Rückmarsche ward ansanglich die Richtung, in welcher wir gekommen, innegehalten; in der Nähe des obenerwähnten Bananengärtchens angelangt, hielten wir uns genau östlich. Nachdem auf diesem Wege zwei Schluchten überwunden waren, gelangten wir in eine dritte, in deren Grunde ein Lavastrom ansteht; aber denselben fliesst ein Bach, welcher die Spuren seiner Thätigkeit in Gestalt sehr regelmässig gebildeter Strudellöcher hinterlassen hat. Unweit oberhalb dieser Klamm erhob sich im O. der "Gunung Loka". Auf der jenseitigen Höhe angelangt, stiessen wir auf einige menschliche Wohnungen. Ein Eingeborener, der etwas Malayisch verstand, geleitete uns heimwarts, ohne dass wir in eine der vier Thaler, welche noch zu bewaltigen gewesen wären, hinabzusteigen brauchten. Da dieselben in der Nähe blind auslausen, so waren dieselben einfach umgangen worden.

Ein schönes, wenn auch keineswegs herzerfreuendes Schausspiel bot der Lompo Buttang am ersten Tage nach unserer Ankunft. Kaum war der Abend hereingebrochen, als die ferne Gipfelmasse gleichsam in eine feurige Gluth getaucht erschien. Ausgedehnte Walder brannten an den Abhängen der uns abgewandten Seite und scharf hoben sich die Bergspitzen von der glühenden Lohe ab, fast als wollten sie zum Himmel schreien ob des Unverstandes der Menschen 1). Ist doch der Zweck des Abbrennens einzig und allein der, auf bequeme Weise zu einigen Maisernten zu gelangen. Nach Ablauf einiger Jahre ist aber der Boden ausgemergelt, durres Alang-Alang überzieht alsdann die Brachfelder und aufs Neue werden Waldbestände geopfert. Die Bewohner der Ebene aber spüren die Folgen dieser Wirthschaft an den jährlich, während der Regenzeit in zunehmendem Maasse nach unten beförderten Geröllmassen. Teyssmann klagt bereits in eindringlicher Weise über diese Zustände 2).

¹⁾ Die Rauchmassen waren so erheblich, dass man in dem 70 Km. entfernten Mekassar glaubte, es hahe irgendwo eine Eruption stattgefunden.

²⁾ Nat. Tijdschr. van Ned. Ind. XXXVIII, 1879, p. 98, 104, 109.

die man anscheinend nicht abzustellen vermag, in diesem Falle allerdings umsoweniger, als die vor uns brennenden Walder zum Reiche Gowa gehören. Der scharse Ostwind (Barubu) — eine in dieser Jahreszeit sur Sud-Celebes charakteristische Erscheinung — sachte die Flammen nur noch mehr an. — Sieht man von diesem Winde, der in den Abendstunden mit grossen Gewalt durch die Bambuswände pfiff, ab, so ist das Klima von Loka ein ausserordentlich angenehmes zu nennen. Nachts sank die Temperatur nicht unter 18,5° C., während das Tagesmaximum sich nicht über 26,5° C. erhob. In Folge dieser ausgezeichneten Lage wird Loka häufig als Lustkurort benutzt.

Am 4^{ten} November ritten wir auf den uns wiederum von Herrn Assistentresident Verhelst freundlichst zur Verfügung gestellten Pferden nach Bonthain hinunter, gingen Abends an Bord des inzwischen angelangten "Sperwer", welcher uns am folgenden Tage nach Makassar brachte.

Da in Folge einer Reparatur an der Maschine des Dampfers unsere Weiterfahrt eine abermalige Verzögerung erlitt, unternahm ich noch einen Besuch des 35 Km. nördlich von Makassar gelegenen Pangkadjéné. Wiederholt war mir namlich aufgefallen, dass unter dem zur Beschotterung der Strassen verwendeten Materiale viele Gerölle krystallinischer Schiefer vorkamen 1), welche, wie sich auf eingezogene Erkundigungen hin ergab, von der Mündung des Pankadjene-Flusses durch die Bewohner des Spermonde-Archipel hergebracht werden. In Anbetracht des Umstandes, dass uns auf der ganzen zurückgelegten Reise kein einziges Gestein begegnet war, dem ein höheres Alter, als das tertiäre zugeschrieben werden konnte, erschien es der Muhe werth, die Lagerstätte selbst in Augenschein zu nehmen. Am 11ten November brachte mich ein Einspanner auf dem p. 924 bereits beschriebenen Wege über Tallo nach Parang-Lowe. Hinter dem letztgenannten Orte geht der Kuristein noch eine Zeit lang zu Tage aus, verschwindet dann, um nur noch einmal in einem Bachbett unfern Maros wieder aufzutauchen. An seine Stelle tritt ein mehr oder weniger reschichteter, gelblicher oder brauner zäher Thon. In das eintönige Bild der flachen, dem Reisbau gewidmeten Ebene bringen vereinzelte Gehölze, velche kleine Dörfer in sich bergen, einige Abwechslung. Bei der An-

¹⁾ Vielleicht ist hierdurch die irrige Angabe von K. Martin, dass "die alte Schieferbrmation in Makassar durch ausgezeichnete Glimmerschiefer vertreten" sei, veranlasst
rorden. (Bijdr. tot de Taal-, Land- en Volkenkunde van Nederl. Indië bij gelegenheid
an het 6° Internationale Congres der Orientalisten, 1883, p. 24). Die alluvialen Abagerungen der Ebene von Makassar werden von dem Kuristein, einem Leucittephritfuff unterteuft.

naherung an Maros treten im Osten die wohlbekannten Kalksteinfelsen auf, wahrend der Bulu Saraung in weiter Ferne bleibt. Nach vierstündiger Fahrt langte ich an dem Fluss von Maros an. Eine Fahre brachte den Wagen an das jenseitige Ufer und unmittelbar darauf befand ich mich im Fort Valkenburg, wo übernachtet wurde.

Mit einem frischen Pferde wurde am folgenden Morgen die Fahr fortgesetzt. Bald lag Maros hinter mir und auf vortrefflicher Landstrasse ging es weiter durch die Ebene. Zu beiden Seiten fast ununterbrochen die in Stoppeln stehenden Reisfelder. Ueber einige der diese Ebene durchschneidenden, in die Makassar-Strasse ausmündenden Flüsse, führen Brücken, andere müssen dagegen mittelst Fähren passirt werden. Im Osten treten allmahlich wieder die mit einem grünen Teppich bekleideten Kalksteinberge heran, um bis Pangkadjene eine nur durch Schluchten unterbrochene Mauer darzustellen. Nach 3 stündiger Fahrt war dieser freundliche, unmittelbar am Flüsse gleichen Namens, gelegene Ort erreicht, wo ich in dem Pasanggrahan, der zugleich einige Bureau's und ein grösseres Lokal für die Gerichtssitzungen enthielt, Unterkunft fand.

Die Betrachtung der Geröllablagerungen an dem Steilabfalle, sowie im Bette des Flusses ergab sofort, dass in der That Gerölle von Quarziten, Gneissen und Glimmerschiefern einen betrachtlichen Bestandtheil der alluvialen Ablagerungen ausmachen. Sie kommen noch weiter stromaufwärts gleichfalls vor und ist es mehr als wahrscheinlich, dass diese Gesteine sich im oberen Laufe des Flusses noch anstehend finden, worass weiter zu schliessen wäre, dass einzelne unbedeutende Theile von Sad-Celebes während der zweiten Hälfte der Tertiärzeit (Neogen) inselartig über dem Meeresspiegel hervorragten. Ein direkter Zusammenhang mit den archaeischen Ablagerungen des centralen Theiles von Celebes 1) bestand während dieser Zeit nicht mehr 2), wie aus dem Profil von der Bai von Pare Pare bis zum Golf von Boni erhellt. Ausser den genannten Gesteinen betheiligen sich an der Zusammensetzung der Geröllablagerungen noch tertiäre Kalksteine, Sandsteine und Basalte (Leucit- und

¹⁾ Das Vorhandensein krystallinischer Schiefer daselbst wird durch die von Prof. Max. Weber bei Gelegenheit seines Besuches von Luwu (Februar 1889) mitgebrachte und anserem Museum verehrte Sammlung erwiesen.

²⁾ Dass Celebes nichts weniger, als ein sabgemagertes Borneo" ist (O. Peschel, Ness Probleme der vergleichenden Erdkunde, 2te Aufl., p. 67), dass überhaupt wesentliche Unterschiede in dem geologischen Bau beider Inseln bestehen, soll an diesem Orte sur kurs hervorgehoben werden.

Feldspath-Basalte). Nicht selten werden auch Chalcedone und Achate gefunden, die zu Ringsteinen geschliffen werden und so das Inslebentreten einer kleinen Industrie veranlasst haben.

In der Frühe des 13ten November fuhr ich auf einer kleinen Lepa-Lepa in Begleitung des Sulewatang (Unter-Regent) stromauswarts. In Folge des derzeitigen niedrigen Wasserstandes machte sich das Eintreten der Ebbe doppelt fuhlbar. Ueberall ragten mit Geröllen übersaste Sandbanke aus dem Flusbette hervor. Die bis 5 m. hohen, steil abstürzenden Uferwände zeigten die Schichten gut aufgeschlossen; zu oberst ein 2-3 m. mächtiger, graubrauner, zuweilen geschichteter Thon. Derselbe ist geschiebefrei enthält zuweilen aber Muschelreste, darunter grosse Exemplare von Tridacna. Hierauf folgt eine Geröllbank, welche wiederum von Thon unterteuft wird. An einzelnen Stellen kommt noch eine zweite Geröllbank zum Vorschein. Nach halbstündiger Fahrt trat unsern des rechten Users des Berg von Matodjeng (Batu Bulu), ein mächtiger Kalksteinfelsen hervor. Derselbe ist fast vollständig bewachsen und an den noch einigermaassen zugänglichen Punkten finden sich Anpflanzungen von Bananen. Weitere 10 Minuten waren kaum verronnen, als wir uns den am linken Ufer hervorragenden Kalksteinselsen naherten, welche noch eine Fortsetzung der von S. her sich erstreckenden Mauer darstellen. Sie halten bis zur Mündung des kleinen Nebenflusses Talang an. Hier stiegen wir aus, gingen langs des rechten Ufers des Baches bis zum Kampong Talang, von wo aus nach weiteren 5 Minuten der Bach überschritten wird. Gleich darauf sind wir am Fusse des Felsen von Tjabili, einer ausgedehnten, gegen 200 m. hohen Kalkfelsmasse, die sich längs des Flusses in östlicher Richtung weiter verfolgen lässt. Die erste Höhle, welche betreten wurde, zeigte nur wenige und roh geformte stalaktitische Tropfsteingebilde. Auf dem Boden liegen massenhaft Schalen einer Batissa sp. 1). lose herum. Eine Breccie, an deren Zusammensetzung sich im Wesentlichen wiederum dieselbe Muschel betheiligt, findet sich an den Felsen gelehnt und fest mit demselben verbunden am Eingange der Höhle. Bis hierher (etwa 20 m. Höhe) reichte zur Diluvialzeit das Meer. Noch eine Reihe von Höhlen finden sich an dieser Felswand vor, einige sogar in

¹⁾ Ich verdanke diese Bestimmung, sowie die weitere Mitheilung, dass eine lebende Batissa von Celebes unbekannt ist, der Güte des Herrn M. M. Schepman. K. Martin spricht diese Ahlagerung als eine Süsswasserbildung an. (Tijdschr. van het Kon. Nederl. Aardr. Genootsch. (2) VII, 1890, p. 277), was daher rührt, dass nur die Gastropoden bestimmt wurden, welche hier in Gestalt einiger weniger eingeschwemmter Neritinen und Melanien auftreten.

betrachlicher Höhe. Merkwürdig erschien mir noch eine Grotte, welche sich westlich von derselben befand und deren Inneres eine zierliche, ganz aus Bambus verfertigte Nachahmung eines buginesischen Hauschens schmückte. Sowohl auf den umherliegenden Steinen, als in dem Häuschen waren Opfergaben in Gestalt zusammengerollter Siri-Blatter deponirt, auch Reste von Kerzen fanden sich vor. Trotzdem seit dem Jahre 1606 sich der Islam schnell über Sad-Celebes verbreitet hat, ist die Bevölkerung ihren heidnischen Gewohnheiten treu geblieben und Matthes hebt bereits hervor, dass die Bethätigung mohammedanischer Glaubensregeln eigentlich nur auf der Beschneidung und dem Anseilen der Vorderzahne beruht. Unsere Begleiter schienen den dargebrachten Opferspenden übrigens keine besondere Hochachtung darzubringen, denn die vertrockneten Siri-Blatter wurden aufgelesen und nach Aneignung des darin befindlichen gelöschten Kalkes wieder weggeworfen. - Wir wanderten auf demselben Wege, wie gekommen, an die Mündung des Talang zurück und schwangen uns hier auf die von dem Controleur Herrn J. C. Dirksen (jetzt Assistent-Resident zu Maros) freundlichst zur Verfügung gestellten Pferde. Jetzt wurde der Fluss von Pangkadjene durchwatet, am rechten User desselben angelangt, ging es an dem Felsen von Matodjeng vorbei, durch den Kampong gleichen Namens und schliesslich nach einem abermaligen Durchschreiten des Flusses längs des linken Ufer desselben nach Pangkadjéné zurück.

Am anderen Morgen ruckte ich abermals mit dem Sulewatang aus, um den Felsen von Matampa zu besuchen. Der Weg führte zunschst über die etwa 50 m. lange Brücke, ein wichtiges Verbindungsglied für die bis nach Segeri und Mandalle reichende Heerstrasse, welche an der Grenze von Tanette endigt. Das jenseitige User umsäumen, ebenso wie das diesseitige, zahlreiche Kampongs, deren Bewohner ihren hauptsächlichsten Unterhalt in dem Reisbau finden. Wir gelangten alsbald an den Kampong Ledjang und da der Felsen von Matampa der Verwaltung desselben untersteht, so erwartete uns hier der Sulewatang, in Vertretung des Regenten, um an dem Ausfluge Theil zu nehmen. Selbstverständlich fehlte dabei auch nicht das übliche Gefolge von Lanzenträgern. Hart am Wege befanden sich tiefe Gräben, welche augenscheinlich hergestellt waren, um Material für die Beschotterung der Strasse zu gewinnen. Unter der oberflächlichen Thonschicht liegt eine ausgedehnte Bank von Kies, zusammengesetzt aus kleineren Geröllen der früher erwähnten Gesteine. In den Boden dieser Gräben hatte man wiederum kleine Löcher eingegraben, um das spärlich hervorsickernde Wasser aufzufangen. Zu

beiden Seiten des Weges dehnt sich eine weite, unendliche flache und fruchtbare Ebene aus, die kühnste Phantasie kann sich jedoch schwerlich eine Vorstellung machen von den wunderbaren, grottesken Gestalten, in welchen die Kalksteinfelsen hier und da sich unvermittelt aus derselben hervorheben. Sie stellen die Ausläufer der Felsenmauer dar, die sich von Süden her erstreckt und sich hier gleichsam in einzelne Fasern auflöst. Als Riffe haben sie in vergangener Zeit aus der Meeresbrandung hervorgeragt, als Felsenburgen haben sie Aufrührern gegen die heranstürmenden Truppen erfolgreichen Schutz geleistet. Aus der Geschichte der letzten Zeit ist der Bata Batuwa besonders bekannt geworden, welcher dem Kraeng Bonto Bonto zeitweilig als Aufenthalt diente. Im Juli 1868 begann der Aufstand und erst am 10ten October 1877 endigte derselbe mit der Unterwerfung des genannten Kraeng. Es ist ein hartes Stück Kulturarbeit, welches sich auf diese Weise langsam vollzieht.

Inzwischen hatten wir uns dem rechts vom Wege liegenden Felsen von Matampa genähert 1). Die gewaltige von West nach Ost sich hinziehende Masse war über und über bewaldet, nur an einzelnen senkrecht abstürzenden Felswänden trat das nackte Gestein hervor. Durch Maisund Bohnenfelder reitend, gelangten wir alsbald an den hohen, schmalen Eingang der an der Sudseite sich befindenden grösseren Höhle. Stalaktiten hängen bereits von Aussen herab. Ebenso wie am Felsen von Tjabili findet sich auch hier hart an die Aussenwand gelehnt und innig mit derselben verwachsen ein jugendliche Muschelbreccie, an deren Zusammensetzung sich hauptsächlich Schalen von Arca granosa, L. betheiligen. Nach dem Eintritt in die Höhle verbreitert sich dieselbe und zu beiden Seiten der Wände zieht sich eine schmale Galerie mit zahlreichen Tropfsteinbildungen hin. Die rechte Wand ist an ihrem Ende mit zahlreichen Namen bedeckt, hauptsächlich von Offizieren, die während des Bonto Bonto'schen Aufstandes zu Pangkadjene in Garnison lagen. Die Höhle setzt sich nach Westen ansteigend noch eine kleine Weile fort, läuft alsdann aber blind aus. Eine kleinere Höhle, gleichfalls am Südabhang gelegen wurde noch besucht und hierauf der Ruckweg angetreten. In Panghadjene angelangt, wurden die Sachen verpackt und nachdem ich mich von Herrn J. C. Dirksen, dem ich für seine liebenswürdige Unter-

¹⁾ Es ist dies wohl derselbe, den Teyssmann als Sapanang bezeichnet (Nat. Tijdschr. v. Ned. Ind. XXXVIII, 1878, p. 60).

stutzung zu vielem Danke verpflichtet bin, verabschiedet, die Fahrt nach Makassar angetreten. Noch an demselben Abend erreichte ich Maru und am Mittage des 15^{tan} November Makassar. —

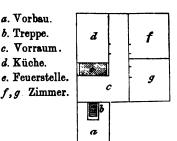
Der letzte Ausflug auf Celebes, dessen Theilnahme wiederum durch die zuvorkommende Gute des Gouverneurs Herrn D. F. van Braam Moris ermöglicht wurde, fand nach meiner im April 1880 erfolgten Ruckkehr nach Makassar statt. Gegen Ende des vorhergehenden Jahres war nämlich seitens der an der Palos-Bai angesiedelten Buginesen die Landschaft Parigi an der Bai von Tomini überfallen worden und hatten die Herren Assistent-Resident G. F. A. Brugman und Gouvernements-Secretar A. J. A. F. Eerdmans den Auftrag erhalten eine Untersuchung des Vorfalles an Ort und Stelle vorzunehmen. Ausser mir nahm noch ein Kaufmann aus Makassar, sowie der Dolmetsch Herr J. M. L. K. Schmidt an der Fahrt Theil. Am 18ten April dampste der Regierungsdampser "Sperwer", diesmal unter der Führung des Capitan Herrn L. Alings, aus dem Hafen von Makassar. Nach reizvoller Fahrt durch den Spermonde-Archivel, kamen wir Nachmittags in tieseres Fahrwasser und so folgte das Schiff auch wahrend der Nacht seinem nach Nord gerichteten Course. Am folgenden Mittage liesen wir in die Bai von Manudju ein, wo Herr Brugman einen Auftrag für die Fürsten der Küstenstaaten zurückliess. worauf wir weiter nordwarts dampsten. Am Morgen des 20ten gelangte Kap Palos bereits in Sicht, gegen Mittag fuhren wir in die schone, tiefe Palos-Bai ein und um 4 Uhr ward an dem aussersten Winkel der Bucht vor dem Kampong Palu (Palos) der Anker ausgeworfen. Während an der Kuste von Sud-Celebes kein Fluss vorhanden ist, dem nicht eine Barn vorliegt, besitzt hier die Bai noch in unmittelbarer Nahe des Strandes eine Tiefe von 180 m. und zur Sicherung des Schiffes musste ein Wurfanker aus Land gebracht werden. Man schaut bei Palu in SSO.-Richtung in eine tiese, breite Thalebene, einerseits gebildet durch die Bergkette, welche sich aus dem centralen Knoten in den nördlichen, schwanzförmig gestalteten Zipfel von Celebes fortsetzt, anderseits durch der Gebirgszug, welcher aus dem Inneren kommend, parallel dem linker User der Palos-Bai streicht und bei dem Kap Palos endet. Nach den später bei Dongala gesammelten Gesteinen zu urtheilen, setzt sich das letztgenannte Gebirge aus tertiären Eruptivgesteinen und Sedimenten zusammen. Dem Landesgebrauch entsprechend wurde der eingeborene Sendling nach Palu gesandt, um den Radja von unseren Absichten in Kenntniss zu setzen. Nach einer reichlichen Stunde kehrte der erstgenannte mit der Botschaft zurück, dass von hier nach Parigi nur ein seht

schlechter Fusspfad existire 1), dagegen sei von dem nördlicher gelegenen Tawoeli aus das Gebirge auf einem weitaus bequemeren Wege zu überschreiten. Einige Abgesandte des Radja hatten den Sendboten bis an den Strand begleitet, doch schreckte sie der heftige Wellenschlag oder besser gesagt, die sichere Voraussicht völlig durchnässt an Bord zu kommen, obwohl sie mit nicht viel mehr als ihrer eigenen Haut bekleidet waren, von der beabsichtigten Begrüssung ab.

Wir blieben während der Nacht vor Anker liegen, dampsten in der Fruhe des 21ten langs der Ostkuste der Bai, und langten nach 11 stundiger Fahrt vor dem Kampong Kaju Malowé an. Abermals wurde der Sendbote ans Land befördert, welcher nach einigen Stunden mit dem Bescheide zurückkehrte, dass die Sache sich von hier aus machen liesse, sowie dass zu unserer Beherbergung ein Haus bereit stände. Nachdem Dienerschaft und Gepäck vorausgeschickt waren, folgten wir um die Mittagsstunde nach und fanden ein grosses leerstehendes Haus unweit des Strandes angewiesen, welches dem Fürsten von Tawoeli gehörte. Der sehr grosse Ort dehnte sich nicht allein längs des mit Cocospalmen besetzten Strandes aus, sondern besitzt auch landeinwärts noch eine beträchtliche Ausdehnung. Die Häuser stehen sämmtlich auf Pfählen, welche jedoch nicht in den Boden eingelassen sind, sondern oberhalb desselben auf grossen Steinen ruhen, vermuthlich der rücksichtlosen weissen Ameisen (Termiten) wegen. Hinsichtlich der Bauart ahneln die Wohnungen den buginesischen, die innere Einrichtung weist aber mancherlei Abweichendes auf. Es scheint auch, als ob die meisten Häu-

ser nur von einer einzigen Familie bewohnt werden. Eine von mir, in Gemeinschaft b. Treppe.
b. Treppe.
c. Vorraum. hatte den beistehenden Grundriss. Sie d. Küche.
war 6 Schritt lang und breit.
c. Feuerstelle

Eine Treppe, oder richtiger Leiter führte f, g Zimmer. durch die Oeffnung eines überdachten Vorbaues. Von hier aus gelangt man auf den Vorsaal, dessen Wande mit verschiedenen Geräthen und Waffen, darunter



¹⁾ Dieser Weg wird auch von C. van der Hart (Reize rondom Celebes, 's Gravenhage 1853, p. 205, 263) erwähnt. — Riedel giebt auf seiner Karte von Central-Celebes, die überhaupt verzeichnet ist, den Abstand zwischen beiden Orten viel zu gross an (Bijdr. t. d. Taal-, Land- en Volkenkunde, (5) I, 1886, p. 77).

Blasrohren 1), behangt sind. Zur Linken nimmt die Knche mit Feuerstelle einen betrachtlichen Raum ein, während zur Rechten sich zwei Zimmer befinden, von denen das eine fast gänzlich von dem Ehebett eingenommen wird; in dem anderen steht eine primitive Wiege und einiges Hausgeräth.

Die Bevölkerung zählt sich zu den Kajelinesen, welche durchaus glatthaarig sind ²). Ihre Sprache soll eine Mischung der alfurischen (Toradja) und
buginesischen sein. Mit Ausnahme der eingewanderten Buginesen sind sie
Heiden. Auffallend ist die grosse Zahl der mit Hautkrankheiten Behafteten
und unter diesen war der höchst unappetitliche Schurf vorherrschend. Wir
sahen auch Menschen längs des Strandes gehend, von denen die Männer
mit hohen spitz auslaufenden Huten versehen waren, während die Kopfbedeckung der Weiber aus lose herabhängenden Tüchern bestand. Diese
Leute, welche gleichfalls glattes Haar trugen, sollten echte Alfuren sein.

Der Passer (Markt) machte einen ausserst durstigen Eindruck. Es gab da etwas Reis, Siri, Limonen und andere Kleinigkeiten, aber alle diese Produkte in hochst minimalen Quantitäten. Die von den buginesischen Landen her bekannten Hühnerdeute (duit ajam) bildeten auch hier die gangbare Scheidemunze. Da uns in *Makassar* gesagt worden war, dass es hier Reis im Ueberslusse gabe, — und das ganze Strandgebiet ist in der That sehr fruchtbar 3) — hatten wir uns nicht mit diesem ganz

¹⁾ Dieselben besitzen die gleiche Form und Gestalt der bei den Toradja's gebränchlichen Blasrohre, wie ein solches von B. F. Matthes in seinem Ethnographischen Atss. Tab. VIII, Fig. 1, abgebildet ist.

²⁾ Die Landschaft Kajeli (Katli) gehört zu den wenig bekannten Gegenden von Celebes. Nur soviel mag hier bemerkt werden, dass dieselbe in früherer Zeit dem Saltan von Ternate angehörte, demselven aber von dem Radja von Gowa abgenommen und erst in Folge des Vertrages von Bungaya (1667) dem ursprünglichen Eigenthümer sarückgegeben wurde. Im Jahre 1684 kam das Gebiet an die Ostindische Compagnie, verblieb aber dem Sultan von Ternate als Lehen bis 1710, wo dasselbe dem Gouvernement von Makassar unterstellt wurde. Von den 6 Herrschaften, welche Blok im Jahre 1759 aufzählt (Tijdechr. voor Nederl. Indie 1848, I, p. 77), nämlich Palu, Benawa, Kajeli, Sigi, Tipa und Loli, existirt nur noch die erstgenannte, während von den übrigen zum Theil nicht einmal die Ortschaften, denen sie ihren Namen zu verdanken hatten, übrig geblieben sind. Kajeli muss etwa in der Gegend zwischen Lere und Towaja gelegen haben, besteht aber heute nicht mehr. (Dasselbe darf nicht mit dem ebenfalls an der Westküste von Celebes, etwa unter 1° 40' S. Br. gelegenen Ore gleichen Namens verwechselt werden). Gegenwärtig wird der dem Gouvernement Celebes unterstellte Theil des Landes in die 3 Herrschaften Tawoeli, Palu und Dongels eingetheilt, mit denen Verträge im Jahre 1854, dann aber wieder im Jahre 1889 sam Abschluss gelangten.

³⁾ Durchaus zutreffend sagt schon der biedere Valentijn: "het is een gezegent land";

unentbehrlichen Nahrungsmittel versehen. Die an den Markt gebrachten Mengen reichten aber höchstens für eine Mahlzeit, so dass Herr Capt. Alings durch die Ueberlassung eines Pikul (ca. 62½ Kgr.) zu einem Retter in der Noth wurde.

In dem grossen, aber etwas verfallenen Hause, hatte die ganze Expedition Unterkunst gesunden, die nunmehr der Dinge harrte, die da kommen sollten. Zuerst stellte sich der Neffe des Radja ein, der mit seinen nackten Beinen und den über die blossen Füsse gezogenen Stieseletten wie ein gestiefelter Kater aussah. Später folgte der Radja oder, wie der Titel eigentlich lautet, Magau 1) von Tawoeli, ein ausserst gebrechliches, durch Opiumgenuss heruntergekommenes Mannchen, welches nicht mehr allein zu gehen vermochte. Der wenig ermuthigende, aber in desto mehr Worte gekleidete Bescheid lautete dahin, dass wir am folgenden Tage den Weitermarsch nicht antreten könnten, da die Zahl der vorhandenen Pferde nicht genüge und erst einige mehr aus Palu beschafft werden mossten. So verging der 22te mit einer Umschau der Gegend von Kaju Malowé. Der flache, sandige Strand schliesst mit einer 2-3 Fuss hohen Geröllablagerung ab, an deren Zusammensetzung sich besonders Granite, Diorite, Glimmerschiefer und Gneisse betheiligen. Während in der Nähe des Strandes die Cocospalmen vorherrschen, stellen sich weiter östlich Sagopalmen ein. Dahinter wird das Land hugelig und steigt allmahlich an. Diese Vorhügel bestehen aus lockeren Sandsteinen und Conglomeraten, welche jedoch in nordöstlicher Richtung sich allmählich von der Kuste entfernen. Ein kleines Flusschen mundet am Orte in die Bai aus.

Am folgenden Morgen konnte der Abmarsch wirklich vor sich gehen. Nachdem ein tüchtiger Regenguss überstanden war, wurden die gewordenen Kulis beladen und vorausgesandt. Noch mit dem Satteln der Pferde veschäftigt, langte der Magau von Tawoeli an, um uns zu begrüssen. Der über Mann sass auf einem mit einer Matratze bedeckten Rosse, während ein langer Bambusstab ihm als Stütze diente. Der Ritt hatte ihn auch dernaassen angestrengt, dass er sich erst durch eine Opiumpfeise stärken musste. Endlich konnten wir kurz vor 10 Uhr auf brechen. Längs des Strandes ging zunächst in nördlicher Richtung, worauf nach einer halben Stunde das rreite, mit zahlreichen Geröllen angesüllte Bett des Flusses von Tawoeli lurchschritten wurde. Am jenseitigen User begann der sehr grosse Kampong

renn er jedoch unmittelbar darauf folgen lässt "dog van leven een vervloekt Sodom" Oud- en Nieuw-Oost-Indiën I, 1724, p. 75), so thut er damit der Bevölkerung bittess Unrecht an.

¹⁾ Fürstliche Personen überhaupt führen den Titel Mardika.

Tawoeli 1), wo wir vor der Wohnung des Radja Halt machten, um noch ein sehlendes Pserd zu erwarten. Hierauf wurde der Marsch in östlicher Richtung fortgesetzt 2). Anfangs erscheint die Ebene unfrucntbar und mit vielem Gestrupp besetzt, bald aber treten in der Umgebung der Dörser Bodia und Balojang Reisselder auf. Von hier ab geht der Weg groesentheils im Flussbett weiter, nachdem wir uns inzwischen den Vorbergen genähert haben. Dieselben stürzen steil ab und setzen sich aus lockeren Sandsteinen und Conglomeraten zustammen, deren Schichten sich meist in schwebender Lage befinden. Ab und zu zeigen sich auch deutliche Verwerfungen und sowohl ein schwaches östliches, wie westliches Einfallen an einzelnen Aufschlussen. Bald beginnt das Thal enge zu werden, während die angrenzenden Berge eine Höhe von 200-300 m. erreichen. Um ‡1 Uhr wird der nur aus wenigen Hausern bestehende und etwa 150 m. über dem Meere liegende Kampong Bomba erreicht. Es ist dies der letzte bewohnte Ort, der bis zum Golf von Tomini angetroffen wird, weshalb beschlossen wurde hier zu übernachten. Bombe liegt im Schatten von Cocospalmen am Fusse eines Hügels, wahrend am gegenüberliegenden rechten Ufer die Felsen fast lothrecht abstürzen (Tab. II, Fig. 6). Die Userrander, sowie das Flussbett sind übersaet mit zahlreichen Blöcken und kleineren Geröllen von Graniten, Gneissen und anderen krystallinischen Schiefern.

Am 24ten April wurde in aller Frühe der Marsch fortgesetzt. Gleich hinter Bomba erweitert sich das Thal zu einem von steil abfallenden Felsmassen eingerahmten Kessel, aber bereits einen Kilometer stromaufwärts verengt sich dasselbe wieder. Je weiter wir vorwärts gelangen, desto wilder wird die Scenerie. In starken Krümmungen windet sich der dahin rauschende Fluss durch die Klamm, gewaltige Felsblocken rager aus dem Wasser hervor und verursachen den tapfer ausschreitenden Pferden nicht geringe Schwierigkeiten. Von Zeit zu Zeit wird der Weg durch herabgefallene Baumriesen versperrt. Liegen dieselben noch einigermaassen hoch, so werden die Pferde abgesattelt und darunter hindurchgeleitet, andernfalls muss längs steiler, bewaldeter Abhänge das Hinderniss umgangen werden. Wo das Ufer nicht durch nacktes Felsgestein begrenzt wird, reicht dichter Urwald hinab und zwar in einer Schönheit

¹⁾ Die nach Norden auf Tawoëli folgenden Kampongs heiseen: Pantaloan, Wani, Labuwa, Lero (mit Kap gleichen Namens an der Palos-Bai), Towaja, Tiwo, Kalebura. Basusu, Alinrao, Seresä.

²⁾ Vergl. das Kärtchen auf Tab. II.

und Ueppigkeit, wie ich noch nie zuvor im Archipel gesehen hatte. Nachdem während eines 21 stündigen Rittes die Sandstein- und Conglomeratschichten angehalten hatten, tritt zu beiden Seiten auf kurze Zeit Granit auf. Hierauf folgen unmittelbar steil nach SO einfallende, in N 45° O. streichende Schichten von Augengneiss. Um 1 10 Uhr langen wir an der Raststätte Lora an. Kein Haus, keine Hutte ist vorhanden, die einen besonderen Namen rechtfertigen könnte. Der Eingeborene hat aber gewissen Punkten im Gebirge Bezeichnungen gegeben, die ihm bei Verabredungen von Nutzen sind. Die einzige Merkwurdigkeit an dieser Lokalität war eine Aushöhlung im Gneissfelsen, auf deren Boden Steine und Aschenreste, welche auf eine Feuerstelle hinweisen, zu bemerken waren. Nach kurzem Aufenthalt ging es weiter und um 12 Uhr Mittags erreichten wir die Raststätte Samboso. Während wir, auf einigen Gneiss- und Granitblöcken uns lagernd, die mitgebrachten und vorher zubereiteten Speisen verzehrten, rösteten die Lastträger ihren Mais. Nach 14 stündiger Pause ward der Weitermarsch angetreten, doch trennte sich hier die Gesellschaft. Die Kuli's schlugen einen Weg ein, der für Pferde unpassirbar ist und direkt über den Kamm des Gebirges führt. Der von uns einzuschlagende Pfad wurde ein Reitweg genannt, eine sehr euphemistische Bezeichnung, denn die Beschaffenheit desselben war eine derartige, dass wir auf ihm kaum eine halbe Stunde zu Pferde und dann auch noch mit grossen Unterbrechungen zuzubringen vermochten. Mit dem weiten Umwege war somit auch noch das Vergnügen verknüpft, die Gäule an der Leine führen zu müssen. Nachdem der Fluss von Tawoeli noch eine Strecke stromaufwärts verfolgt worden war, bogen wir in N 10° O. Richtung ab und erklommen auf schmalem, schlupfrigem Pfade den Bergrücken Damanu. Nach Ueberschreitung desselben gelangten wir in das tiefe Thal des Ponto Malakuwa, der sich augenscheinlich in den Tomini-Golf ergiesst. Auch hier befindet sich eine Raststätte. Das schmale Bett des Baches diente fast bis zu seiner Quelle als Pfad. Endlich hatten wir um 6 Uhr die Höhe erreicht, nirgends aber gestattete das Baumlabyrinth einen Ausblick, nirgends war auch die Spur einer menschlichen Wohnstätte zu gewahren. Der Versuch, trotz der schnell hereinbrechenden Dunkelheit noch den Abhang hinabzusteigen, musste bald aufgegeben werden. So sassen wir mitten im Walde ohne Speise und ohne Trank, das feuchte Erdreich als Lagerstätte, der Sattel als Kopfkissen dienend. Nicht ohne Weiteres jedoch fügten wir uns mit ergebungsvollem Gleichmuthe in unser Schicksal. Es wurde geschrieen, gebrullt, gejodelt in allen Modulationen, deren die menschliche Stimme fähig ist - keine Ant-

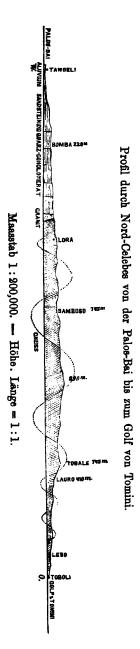
wort. Einem der Eingeborenen wurde eine verhältnissmässig hohe Summe geboten, um in die Tiefe hinunterzugleiten und Fackeln zu holen. De Mann kam bald zurück mit der Erklärung, dass der Auftrag unausnirbar sei. Damit war jede weitere Erörterung erledigt, oder hätte wenit stens erledigt sein sollen. - Eine stockfinstere Nacht war hereingebre chen. An Stelle der Todtenstille, welche während des Tages im Waldt geherrscht hatte, nahm nach dem Verschwinden des letzten Somerstrahles plotzlich wie auf Commando ein vieltausendstimmiges Concet seinen Anfang. Das Orchester setzte sich ausschliesslich aus Cicada zusammen, welche ihr schrilles Gezirpe mit unermüdlicher Ausdaue etonen liessen. Ein fahler, flimmernder Schein ergoss sich, soweit des Auge reichte, über den Erdboden. Streckte man die Hand nach des leuchtenden Stellen aus, so ergriff man phosphorescirende, modernit Pflanzentheile. Das angelegte Feuer verglomm bald in Folge des Magels an trockenem Holze. Hierauf bemühte sich ein Jeder wenigstes dem Schlase einige Stunden abzuringen. Mit dem grössten Gleichmutte hatten sich anscheinend unsere eingeborenen Begleiter, sowie die Pferde in die Lage gefunden, denn nicht der geringste Klageton wurde ihreseits laut. Auch dann noch nicht, als um Mitternacht ein echter und rechter tropischer Regenguss niederzuprasseln begann und mit einer kuzen Unterbrechung bis zum Morgengrauen anhielt. Das war das Nachtlager im Walde von Tosale!

Kaum hatte sich der erste Schimmer des heranbrechenden Tages be merkbar gemacht, als sich Alles erhob. Bei dem schwierigen Abstieß hatte Jeder soviel mit sich selbst zu thun, dass es den Pferden einfad überlassen wurde, sich selbst den Pfad zu suchen. Bewundernswerth wie es, wie diese Thiere über die steilen, schlüpfrigen Abhänge abwarts in gelangen wussten. Sie schlossen die Vorder- sowie die Hinterfüsse in sammen und liessen sich hierauf hinuntergleiten, als ob es ein Schlittenpartie galte. Auch die übrigen Hindernisse, so die quer über dem Pfade liegenden stachligen Stämme der Rotang-Palme, die innig mit einander verwobenen Lianenstämme, wurden mit Eleganz genomen. Mit weniger Geschick erledigten sich die Herren der Schöpfung ihrer Aufgabe, aber schliesslich langten doch alle Theilnehme unversehrt an der Raststatte Lauro an 1). Hier erwarteten uns die Kults

¹⁾ Riedel erklärt, (Tijdschrift voor Ind. Taal-, Land- en Volkenk. XVIII, Batris 1872, p. 567), dass dieser Weg, sobald er in Ordnung gebracht sei, für Fuhrwerke in nutzt werden könnte. Es kommt eben nur auf das Inordnungbringen an!

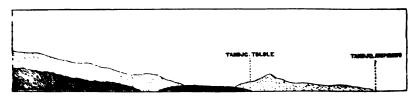
welche am vorigen Abend ihre Hutten aufgeschlagen und unter dem Schutze derselben die Nacht zugebracht hatten. Das Lager bildet ein kleines, offenes Fleckchen im Walde, an dem der Fluss von Lauro (hier noch ein Bach) sein klares Wasser vorbeiführt. Jenseits des Bergstromes schliessen Gneissfelsen den Ort ab. Nachdem wir uns einige Stunden Ruhe gegönnt, den äusseren Menschen gereinigt und den inneren gestärkt hatten, wurde der Abstieg zur Küste fortgesetzt. Wiederum bildete der Flus resp. dessen Uferränder den Weg, bis wir nach zweistundigem Marsche denselben verliessen und in eine Ebene gelangend, bald den von den Buginesen von Wani und Dongala im vorigen Jahre ausgemordeten und abgebrannten Kampong Lebo erreichten. Die Bewohner dieses Dorfes hatten die Lastträger eines buginesischen Handelsmannes ausgeraubt und getödtet, während dieser selbst sich die Angreifer mit Hulfe eines Repetirgewehres 1) vom Halse gehalten hatte.

Von Lebo ab senkt sich das erweiterte Thal allmählich bis zu dem unmittelbar am Strande liegenden Toboli. In dem, dem Sohne des Mardika gehörenden Hause fanden wir sämmtlich ein gutes Unterkommen, welches um so willkommener war, als bei Menschen, wie Thieren sich das Bedurfniss nach Ruhe in gleichem Maasse geltend machte. — Der Küstensaum, welcher in dieser Gegend den Busen von Tomini umrandet, ist mit vielen kleinen Einbuchtungen versehen, sehr fruchtbar, beschränkt sich jedoch nur auf eine schmale Zone. Gleich dahinter beginnt das krystal-



¹⁾ Diese Gewehre werden meist durch Araber von Singapore und zwar zum Preise von 175—225 fl. verhandelt. Fürwahr kein schlechtes Geschäft!

linische Schiefergebirge, während die am Westabfall so ausgedehnten Sandsteine und Conglomerate völlig zu sehlen scheinen. Der Bau des Gebirges ist sonach ein durchaus einseitiger, und der Ostabfall desselben ausserdem der steilere. Die Schichten der krystallinischen Schiefer erscheinen stark gefaltet und vielsach verworsen. Nach den eingezogenen Erkundigungen zu urtheilen sindet die Gebirgskette in der Höhe von Kasimbära ihr Ende Hier soll die Halbinsel in ihrer ganzen Breite eben sein und nur einige haushohe Hugel aus derselben hervorragen. Unser Hausherr machte uns geradezu den Vorschlag mit ein Paar Prauen nach Kasimbära zu segeln, um von dort aus die Westkuste bei Seresa zu gewinnen. Da einer unserer Begleiter geradezu mit Schaudern an den Ruckweg dachte, so wurde der Vorschlag ernstlich erwogen, schliesslich aber doch von der Aussuhrung desselben abgesehen. Die sich vom Strande aus nach N.



darbietende Aussicht reicht, wie beistehende Figur zeigt, bis zum Kap Ampibatio¹), wo das Gebirge sich zu verslachen scheint, in Uebereinstimmung mit der uns gemachten Angabe. Sudwarts reicht der Blick bis zu dem im SO. befindlichen Kap Sausu²).

Am 27ten April sollte die Besprechung mit dem Radja (Magau) von Parigi in dem Orte Pelawa stattfinden. Der Weg dorthin führte längs des sandigen Strandes, welcher jedoch bis zum Niveau des Fluthstandes dicht mit Bäumen und Buschwerk bewachsen war. In die vielen kleinen Buchten münden häufig Flüsschen aus. Nach einem halbstündigem Ritte gelangten wir an das mit Empai bezeichnete, aber unbewohnte Strand-

¹⁾ Nördlich von Toboli folgen die Kampongs in nachstehender Reihenfolge auf einsuder: Akuluwa, Labuasari, Waiwolo, Marantale, Silanga, Sinëu, Labuan poso, Tobers, Tobie, Toga, Ogotai, Ampibawo, Ralusa, Tampobaja, Toriburu, Dongulo, Laimante, Kasimbara oder Kasimba, Pausona, Tada, Siëné, Nenenili, Tapé, Siginti, Sipaje, Paudjalva, Sidowa, Donkasi, Tinumbo, Babalo, Palasa, Tomini.

²⁾ Südwärts von Toboii folgen einander: Pelawa, Petapa, Parigi, Tobinotu, Doage, Sausu, Marcau, Pebenko, Maliaii, Polande, Tanbarana, Kalora, Kilo, Kamiasi, Mopane, Poso, Malei, Toado, Tarau, Banano, Wedele, Todjo, Kanioli, Bonka, Bunte, Maloto. Vergl. hierru das von P. A. Leupe zusammengestellte Verzeichniss in C. B. H. von Rosenberg. Reistochten in de Afdeeling Gorontalo. Amsterdam 1865, pag. 151.

gebiet, welches die Grenze zwischen Pelawa und Toboli darstellt. Erst nach weiteren ? Stunden stellten sich die ersten Hauser ein, welche an Gärten von Bananen, Pinangpalmen (Areca Catechu, L.) und Brotfruchtbäumen (Artocarpus incisa, L.) gelegen waren. In der in der Nähe befindlichen Bucht, die gleichsam den Hafen von Pelawa darstellt, lagen einige Prauen. Kaum in dieselbe eingebogen, sahen wir von Süden her den Magau von Parigi mit seinem Gefolge herankommen. Nach einer ziemlich formlosen Begrussung wurde der weitere Weg gemeinschaftlich zurückgelegt. Wir bogen von der Bucht scharf nach Osten ab und ritten durch eine flache Ebene, bis wir nach Ablauf einer kleinen halben Stunde den nahe am Fuss des Gebirges gelegen Kampong Pelawa erreichten. Was unsere Aufmerksamkeit an demselben besonders fesselte, war, dass derselbe sich in einem ganz vorzüglich befestigten Zustande befand. Mehrere Reihen hoher Bambuspalisaden im Geviert bildeten die Umwallung des Ortes, die nach Aussen von einer Hecke scharf zugespitzter Bambusstäbe (sog. Bambu duri) umgeben war. Auch die drei Ausgange des Kampongs waren palisadirt. Diesem Umstande hatte es Pelawa jedenfalls zu danken, dass der Rachezug der Buginesen an ihm vorbeigegangen war. Desto eindringlicher waren die Klagen des Magau von Parigi. Kaum hatten wir in der, in der Mitte des Ortes belegenen grossen Versammlungshalle auf den Matten Platz genommen, als die Erzählung ies Vorfalles begann. Der langen Rede kurzen Sinn war, dass der Auffassung des Radja zufolge, den Buginesen für das ihrem Landsmanne ingethane Unrecht genügende Entschädigung ausgezahlt worden sei, aber rotzdem hatte noch ein Angriff stattgefunden. Dass die Bewohner von Parigi auch gerade keine Lämmer sind, geht daraus hervor, dass ihr Campong am 10ten Octbr. 1857 wegen wiederholter Widersetzlichkeit bechossen und niedergebrannt werden musste 1). Den Leuten war dieses Breigniss noch im guten Gedächtniss geblieben, sie beklagten sich aber laruber, dass damals 2 Hauptlinge an Bord des Dampfers "Etna" gecommen seien, die alsdann, trotz zugesicherten freien Geleites weggeahrt worden waren. Im vorigen Jahrhundert besass Parigi sogar eine leine Besatzung, welche aber im Jahre 1795 eingezogen wurde. lachdem das Hauptthema erledigt worden war, wurden Erkundigungen ach einem guten, über das Gebirge führenden Wege eingezogen. Der Radja estatigte, dass ein Pfad nach Palu existire, aber die Wenigen, denen

¹⁾ Verhandel. en berigten betreffende het Zeewezen. Amsterdam, Jaargang 1860, g. 116.

derselbe bekannt gewesen sei, wären unglücklicherweise von den Buginesen getödtet worden (sic!). Damit war die Tagesordnung erledigt. In bester Freundschaft schieden wir voneinander und langten des Nachmittags wieder in Tololi an. Bereits am gestrigen Tage hatte der Mardika um ein Schaf!) verehrt, heute aber liess er einen jungen Buffel opfern, von welchem auch die Kulis ihren Antheil bekamen. Dieselben Leute, welche Reis zurückwiesen und denen ihrer eigenen Aussage nach ein Maiskolben für einen Tag zur Noth genüge, lieferten angesichts des Fleisches Beweise einer wahrhaft heldenhaften Genuss- und Vertilgungsfähigkeit. Während des ganzen Abends, und sowie eines Theiles der Nacht gingen die Feuer nicht aus und am anderen Morgen sah Herr Schmidt, der die Aufsicht über die Essvorrathe führte, mit Bekummerniss, dass der für die Rüctreise bestimmte Maisvorrath bedenklichen Angriffen ausgesetzt gewesen war.

Am 28ten April rüsteten wir uns zur Abreise, konnten aber, da der Magau von Parigi sich noch im Lause des Vormittags einstellte, erst gegen 11 Uhr abziehen. Diesmal wurde nicht der Umweg über den Kampong Lebo gemacht, sondern direkt aus den Fluss von Lauro zugesteuert, der, nach einem reichlich halbstundigen Ritte, in westlicher Richtung erreicht wurde. Von hier ab führt der Weg zumeist durch das Flussbett und langen wir bereits um 1 Uhr 15 Min. an der Rasstatte Lauro, welche 410 m. hoch liegt, an. Da eine Ueberschreitung des Gebirgskammes im Lause des Tages voraussichtlich nicht zu ermöglichen gewesen wäre, so wurde hier das Nachtlager ausgeschlagen. Mit der den Eingeborenen eigenen Geschicklichkeit waren nach Ablauf weniger Stunden ganz vortrefflich zusammengesugte Hutten errichtet Wir waren diesmal wohlgebettet und kein Ereigniss störte unsere Nachtruhe

Am folgenden Morgen wurde in aller Frühe abgekocht. Die Pserde schlugen sammt ihren Besitzern den Weg über den Wald von Tosale ein, während wir diesmal den Kulis folgend in der Schlucht des Flusses von Lauro stromaufwärts schritten. Nachdem wir ununterbrochen während einer reichlichen Stunde, theils durch den Bergstrom gewatet, theils über die in demselben liegenden schlüpfrigen Felsblöcke geklettert waren, musste eine steile Anhöhe erstiegen werden, worauf wir alsbald an die Raststätte Toindato gelangten. Von hier ab führte der Weg sogleich in ein kleines Bachbett, dessen Lauf bis zu der Quelle gefolgt wurde. Oben

¹⁾ Sogenannte Fettsteissschafe, welche in diesem Theile von Celebes, sowie auch jenseite des Gebirges vortrefflich gedeihen. Es ist unbekannt, wann und durch wen diese Race eingeführt worden ist.

angelangt befanden wir uns in 890 m. Höhe auf der Wasserscheide. Wenige Schritte von dem Grate entfernt, entsprang jenseits desselben der Fluss von Tawoeli. Eine Zeitlang konnte in dem Bett desselben abwärts gestiegen werden, alsdann aber kamen einige treppenartige Absatze, welche die Bildung einiger Wasserfälle veranlassten und diese mussten auf einem schmalen, hart an einer Felswand laufenden Pfade umgangen werden. Dies war der schlechteste Theil des Weges, aber so lebensgefährlich, wie er uns geschildert, war er denn doch nicht. Ohne wesentlichen Unfall wurde das Flussbett wieder erreicht und um die Mittagstunde waren auch die Nachzügler an der Stätte Samboso angelangt. Dem bekannten Wege weiter folgend ruckten wir kurz vor Anbruch der Nacht in Bomba ein. Und das war unser Gluck! Um die neunte Abendstunde hörten wir ein Geräusch, welches wie ferner Kanonendonner erklang. Mit unheimlicher Schnelligkeit rückte dasselbe 'näher und näher und nach wenigen Sekunden brausten die Wogen des plötzlich angeschwollenen Stromes in der Nähe unserer Behausung vorbei, so dass man selbst das Geräusch der mit grosser Gewalt gegen einander schlagenden Felsblöcke deutlich unterscheiden konnte. Die ganze Nacht hindurch raste der Banjir und erst des Vormittags gegen 10 Uhr war am folgenden Tage das Wasser soweit gefallen, dass wir unseren Weg, von kundiger Hand geleitet, fortzusetzen vermochten. Nach einstundigem Ritte wurde der an dem am linken Ufer befindliche Kampong Battangari erreicht, der von Bananengärten, Pinang- und Cocospalmen-Anpflanzungen umgeben ist. Weiter geht es durch wohlbestellte Reisfelder an den Kampongs Bogawaja und Anja vorbei. Bald darauf blitzt die spiegelglatte Palos-Bai auf und nach einer weiteren halben Stunde befinden wir uns in Kaju Malowé. Am Strande angelangt, sehen wir nach wenigen Minuten ein Boot vom "Sperwer" abstossen, welches uns sogleich an Bord bringt. Das uns hier umfangende Wohlleben liess gar bald die Anstrengungen und Mühen der verflossenen Tage vergessen, desto lebhafter trat aber das Bild der genossenen Naturschönheiten hervor, die sich unauslöschlich dem Gedächtnisse eingeprägt haben. - Am folgenden Morgen den rten Mai dampsten wir nach Dongala hinuber, wo die Herren Brugman und Eerdmans mit den Hauptlingen, des vorjahrigen Ueberfalls wegen, zu verhandeln hatten. Am 3ten Mai wurde die Bai von Mamudju erreicht und nachdem die Fahrt noch an demselben Tage fortgesetzt wurde, langten wir am Abend des 4ten wieder in Makassar an.

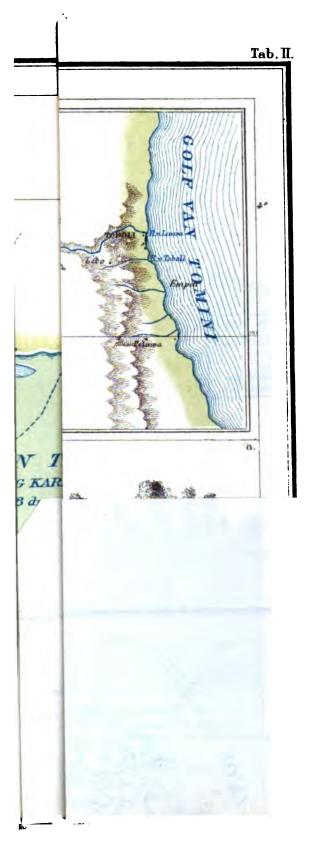
BEMERKUNGEN ZUR KARTE.

Als Grundlage der auf Taf. II zur Darstellung gelangten Routs

Pâre-Pâre bis Palima diente die grosse, vom topographischen Bi
in Batavia, in 4 Blättern herausgegebene Karte von Sūd-Celebese,
selbe reicht im N. bis zur Bai von Pâre Pâre und giebt noch de
derselben nach Masépe führenden Weg an. Von letztgenannten Of
reicht sie hinunter bis Batu Batu und folgt sodann dem Sud-Ufer
Tapparang-Karadja. Von Tempé bis Palima bildet der Lauf des
ralang resp. Tjenrana den Abschluss derselben. — Für die Darste
der Buchten von Pâre Pâre und Supa konnte noch H. A. Modde
Kaart van de Westkust van Celebes. Amsterdam 1868 benutzt wei

Bei der Konstruktion der Routenausnahme wurden Pare Pore, nuwa und Palima als feste Punkte angenommen. Wie sich bereits at Texte ergiebt, ist der unterste Lauf des Tjenrana während der befahren worden. Die Darstellung dieses Theiles beruht daher ausso lich auf der obenerwähnten topographischen Karte. Die nördlich Tempé liegenden Ortschaften sind theils erkundet worden, theils ihre Eintragung auf den Angaben von F. J. Bernard, sowie des I Matola, welche in dem Werke von P. B. van Staden ten Brink: Celebes. Utrecht 1884. Bijlagen p. 145, 151, abgedruckt sind. Aud dem Buche von R. Mundy. Narrative of events in Borneo and Cel London 1848. Vol. I beigefügte Karte konnte in dieser Beziehung werthet werden. Bei allen Ortschaften, die weder von mir bes noch gesehen wurden, sind die Namen punktirt unterstrichen. Di Minralang, bezw. am Tjenrana liegenden Dörfer sind mit den mit den Ruderern bezeichneten Namen eingetragen. Bezuglich der Ca Fig. 1-6 findet sich im Texte das Nähere.

Für die Darstellung des Weges von Kaju Malowé resp. Tawol der Palos-Bai nach Toboli am Golf von Tomini standen mir kei Vorlagen zur Verfügung und beruht dieselbe somit gänzlich auf ei Aufnahmen.



HE NEW YORF

CACITAGHOLI SE

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TWEE BELANGRIJKE WERKEN

OP HET GEBIED DER

GESCHIEDENIS VAN DE AARDRIJKSKUNDE,

DOOR

Prof. Dr. C. M. KAN.

A. E. Nordenskiöld. Facsimile-Atlas to the early history of cartography with reproductions of the most important maps printed to the XV and XVI centuries. Translated from the Swedish Original by Johan Adolf Ekelöf Roy. Swed. Navy and Clements R. Markham C. B. F. R. S. Stockholm MDCCCLXXXIX 1).

Ecclesiae Londino-Batavae Archivum. Tomus primus. Abrahami Ortelii (Geographi Antverpiensis) et virorum eruditorum ad eundem et ad Jacobum Colium Ortelianum (Abrahami Ortelii sororis filium) Epistulae. Cum aliquot aliis epistulis et tractatibus quibusdam ab utroque collectis (1524—1628). Ex autographis mandante ecclesia Londino-Batava edidit Johannes Henricus Hessels. Cantabrigiae typis Academiae sumptibus ecclesiae Londino-Batavae 1887.

I. DE FACSIMILE-ATLAS.

Beslaat de geschiedenis der aardrijkskunde een belangrijke bladzijde in het verhaal der ontwikkeling van het menschdom, niet minder de daarmede zoo nauw verbonden geschiedenis der cartographie.

Immers de kaart stelt op de meest concrete wijze voor oogen, hoever de mensch in de verschillende tijdperken dier ontwikkeling aan de hem

¹⁾ Bij het ter perse gaan van dit artikel verschijnt in Peterm.'s Mitteil. XI, p. 270, de voortreffelijke bespreking van den Facsimile-Λtlas door Prof. F. R. von Wieser-De belangstellende lezer zal bespeuren, dat wij den gang van Nordenskiöld's onderzoek en de door hem verkregen resultaten meer tot in bijzonderheden nagaan dan Prof. v. Wieser verklaart te willen doen, terwijl deze op zijn beurt eenige quaesties uitvoeriger bespreekt. Voor zoover mogelijk, zullen wij daarop nog de aandacht vestigen.

ingeplante begeerte om de planeet, die hij bewoont, in haar geheel te leeren kennen, heeft weten te voldoen; hoe de kennis dier planeet soms voor-, soms ook achteruit is gegaan; hoe mèt dien voor- en achteruit gang, de wetenschap of de kunst om de verkregen kennis meer of minder juist en volledig terug te geven, gelijken tred houdt, terwijl, in onze dagen vooral, de kaart tevens in het licht stelt, welke nieuwe gedeelten van den aarbol in het wereldverkeer worden opgenomen, gekoloniseerd of op eenigerlei wijze in exploitatie gebracht.

Is dus de kaart of Atlas een eerste bron, een sterk sprekende getuige bij de behandeling der geschiedenis van de beschaving, dan is het des te meer te betreuren, dat die bron voor sommige tijdperken der geschiedenis zoo karig vloeit; en dat de kaarten, welke het sterkst sprekende bewijs van den voor- of achteruitgang der geographische wetenschap zouden kunnen leveren, soms zoo moeilijk binnen het bereik vallen van hen, welke dien voor- of achteruitgang hebben te constateeren.

Eeuwen lang toch was die kaart slechts manuscript; en van de oudste gedrukte kaarten zijn de weinig overgebleven exemplaren naar bibliotheken of particuliere verzamelingen verhuisd, van waar zij, zoo hun bestaan al ter algemeene kennis is gebracht, toch niet zoo gemakkelijk ter bestudeering en vergelijking worden toegezonden.

Geldt dit uit den aard der zaak het meest van kaarten, in de oude geschiedenis en tijdens de Midden-Eeuwen samengesteld, ook met die der vijftiende en zestiende eeuw is dit nog het geval, totdat eerst, in het laatst der 16e en 17e eeuw, door den vooruitgang der boekdrukkunst en onder den invloed der schilderkunst, kaarten en atlassen niet enkel veel beter, maar ook in veel grooter aantal werden gepubliceerd, zoodat zij bewaard konden blijven en ook nu nog zooveel gemakkelijker binnen het bereik van velen kunnen vallen.

Intusschen bleef die ontoegankelijkheid der bronnen voor de studie der zoo belangrijke vijftiende en zestiende eeuw bestaan: een bezwaar, dat des te levendiger werd gevoeld, toen de belangstelling in het tijdperk der nieuwe ontdekkingen, vooral in Amerika, hand over hand toenam en men een zoo ernstig onderzoek instelde naar de kaarten, die voor en tijdens het omzeilen van Afrika, het onderzoek van Azie's Oostkust en de ontdekking der Nieuwe wereld bestaan hadden.

Bleek daaruit opnieuw, hoe zeldzaam deze geworden waren, dan mag het geen wonder heeten, dat er des te ernstiger over werd nagedacht om die enkele exemplaren met de uitstekende hulpmiddelen der nieuwere techniek te reproduceeren. Werden in dien geest reeds verschillende stappen gedaan en zagen daardoor belangrijke publicaties het licht (zie beneden), een meer afdoende maatregel werd in dezen genomen door prof. Nordenskiöld, die zeker meer dan iemand anders, toen hij zich tot zijn vele reizen voorbereidde, de noodzakelijkheid had leeren inzien om volkomen op de hoogte te zijn van het bekende, als men tot het onderzoek van het onbekende wil overgaaan, en die, zooals hij in de Preface van zijn Atlas verzekert, ook bij zijne studiën 1) had ondervonden, dat de geschiedenis der geographie in het tijdperk der groote ontdekkingen te nauwernood volkomen te begrijpen is "without a comparative study of the maps which were then accessible and on which the explorers based their schemes for new enterprises."

Blijkt uit het bovenstaande alleszins voldoende, welke motieven Nordenskiöld tot het uitgeven van zijn Facsimile-Atlas hebben geleid, dan willen wij — na er nog even op te hebben gewezen, dat deze ook moet dienen "to promote new discoveries in the recesses of libraries and map-collections" — terstond nader in het licht stellen, hoe hij zijn plan heeft uitgevoerd. —

Reeds dadelijk zij opgemerkt, dat hij zich bij het reproduceeren der belangrijkste en meest karakteristieke kaarten der 15de en 16de eeuw tot de gedrukte bepaalde: vooreerst om den reeds uit den aard der zaak zeer hoogen prijs van den atlas nog niet te verzwaren; ten anderen, dewijl vele manuscriptkaarten reeds in de beroemde atlassen van Jomard ²), Santarem ³), Lelewel ⁴), Theobald Fischer ⁵) en anderen gepubliceerd waren. Voorts heeft ook de noodzakelijkheid om aan zijn werk geen te colossale afmetingen te geven, hem van de reproductie van sommige zeer groote kaarten moeten terughouden; en dit des te eerder, als zij slechts

¹⁾ Over de reizen langs de noordkust der oude wereld, de reizen der gebroeders Zeni, Marco Polo, oude globes, enz. (Zie Mitt. 1890, p. 270).

²⁾ Les monuments de la géographie ou recueil d'anciennes cartes européennes et orientales publiés en fac-simile de la grandeur des originaux, Paris (s. a.). Zonder tekst uit-gegeven. Vgl. daarbij het artikel van Cortambert in het Bull. de la Soc. de géogr. à Paris (1879), getiteld: Introduction à l'Atlas des Monuments etc.

³⁾ Essai sur l'histoire de la Cosmographie et de la Cartographie pendant le Moyen-Age et sur les progrès de la géographie après les grandes découvertes du XV siècle. Paris 1849-52 (3 vol.) et Atlas composé de mappemondes et de cartes hydrographiques et historiques du XI au XVIIc Siècle, pour la plupart inédites (1855).

⁴⁾ Géographie du Moyen-Age et Atlas, Bruxelles 1850-52.

Sammlung mittelaltlicher Welt- und Seekarten italienischen Ursprungs und aus italienischen Bibliotheken und Archiven, Venedig 1886.

op een zeer verkleinde schaal konden teruggegeven worden, waardoor de reproductie toch veel van hare waarde zou verliezen. Bleven deze du in den eigenlijken Atlas achterwege, in den tekst, welke dezen voorsfgaat, wordt van zulke kaarten (bijv. de voor eenige jaren ontdekte groot kaart van Scandinavie, door Olaus Magnus vervaardigd; Mercator's aardglobe; Cabot's planisfeer; Mercator's Flandria en diens groote kaart "ad usum navigantium") toch een meer of min uitvoerige beschrijving, niet zelden ook een reproductie gegeven.

Wat nu verder dien tekst betreft, hij beslaat met de ingelaschte kaartenreproducties niet minder dan 136 pp. groot folio. Toch is hij een model van degelijkheid, helderheid, en, het zoo breede en moeilijke onderwerp in aanmerking genomen, van beknoptheid: eigenschappen, die het van den anderen kant zooveel moeilijker maken om van den rijken inhoud, ook slechts bij benadering, een volledig denkbeeld te geven. Toch zullen wij het beproeven. De welwillende lezer zal gemakkelijk begrijpen, dat het ons daarbij meer te doen is om zijne belangstelling te wekken en tot kennismaking met den atlas aan te sporen dan om hier alle in die 136 pp. vermelde feiten terug te geven. —

Niet minder dan 33 dier bladzijden worden aan de bespreking van den Atlas van Ptolemaeus, de daarvan verschenen edities en pseudo-edities, de dwalingen, waarin Ptolemaeus verkeerde, alsmede zijne verdiensten geschonken. Zeer terecht verklaart prof. N. die uitvoerige bespreking uit den invloed, door de oudste edities van Ptolemaeus werk en door zijne kaarten op de oudste gedrukte atlassen uitgeoefend. Zij vormen daarvan als 't ware de prototype: niet enkel ten opzichte der regels en der richting, door Ptolemaeus bij de samenstelling van kaarten en de voorstelling van land en zee met hunne grenzen, bergen, rivieren en steden gevolgd en gegeven, maar ook, wat betreft het orienteeren of de plaatsing der windstreken (het Noorden boven, het Oosten rechts), het gradennet en in vele gevallen ook de projectie der kaarten.

Dit feit springt bijzonder in het oog, als men de kaartwerken, onde dien invloed ontstaan, vergelijkt met de Tabula Peutingeriana 1), met Arabische kaarten, met Chineesche, Japansche of schetskaarten van wilden, die allen buiten den invloed van den Alexandrijnschen geograaf gebleven zijn. Overigens wordt de verklaring van dit feit zooveel te gemakkelijker, wanneer men in het oog houdt, dat alle of bijna alle atlassen

¹⁾ Of met de wereldkaart uit de "Rudimentum Novitiorum", in 1475 te Lübeck verschenen en door prof. N., p. 3, verkleind, gereproduceerd. Op die kaart bevindt zich het O. boven, het N. links, het Z. rechts en het W. beneden aan den voet der kaart

en kaartenverzamelingen, die tusschen het jaar 1472 of 1478, toen de eerste editie van Ptolemaeus, die met kaarten voorzien was, gedrukt werd, en het jaar 1570, waarin de eerste editie van Ortelius' Theatrum Orbis Terrarum het licht zag, ontstonden, eigenlijk slechts nieuwe edities van Ptolemaeus mochten heeten, gewoonlijk vermeerderd met eenige Tabulae novae, ook weder op de wijze van Ptolemaeus samengesteld en voorzien van Addenda, waarin dan de jongste ontdekkingen meer of minder zorgvuldig zijn opgenomen.

Hoe groot echter die invloed van den Alexandrijnschen geograaf ook moge geweest zijn, wij zullen Nordenskiöld toch niet verder volgen bij dat gedeelte van den tekst, waarin diens leven uitvoerig besproken wordt. Daar dit niet rechtstreeks met ons onderwerp in verband staat en ook elders meermalen ter sprake kwam, staan wij liever iets langer stil bij de hoofdstukken II en III, waarin de verschillende edities van Ptolemaeus en de gebreken en verdiensten van zijn invloedrijk kaartwerk worden uiteen gezet.

Het is bekend, dat dit werk, hoewel tegen het einde der oude geschiedenis het eenige van dien aard, door geographen en geschiedschrijvers van dien tijd om 't zeerst geprezen en door de Arabieren meermalen vermeld en gevolgd, in den loop der Midden-Eeuwen en in de Christelijke Germaansche wereld geheel in vergetelheid geraakte, en daarmede tevens de daarin gevolgde methode om kaarten samen te stellen. In plaats van Ptolemaeus' heldere, meestal goed geproportioneerde, niet zelden op astronomische waarnemingen gebaseerde kaarten, ontstaan er, die alle verhoudingen missen en overdekt zijn met figuren van koningen, monsters en fantastische wezens, ontleend aan de mythische wereld der christelijke of heidensche legenden. Een uitzondering maken alleen eenige kaarten, in het begin der veertiende eeuw in Italië en op de Balearische eilanden ontstaan, uitsluitend ten gebruike van zeelieden en scheepeigenaars vervaardigd en uit gegevens, door dezen verschaft, samengesteld. Het zijn de "portolano's" of "loxodromische" kaarten, waarop wij later terugkomen. Hoewel zij de kusten soms beter voorstelden dan Ptolemaeus, bepaalden zij zich slechts tot het voorstellen der Zwarte en Middellandsche zee alsmede de westelijke en noordwestelijke gedeelten van Europa.

Toen dus in de 15e eeuw Ptolemaeus' kaarten van de geheele wereld in manuscript van Constantinopel uit in West-Europa bekend en verspreid werden, maakten zij bijna geen minderen indruk dan de ontdekking der nieuwe wereld door Columbus. Nog vóór het einde dier eeuw waren reeds zeven folio-edities van zijne Geographie, rijkelijk geillustreerd en overvloedig met kaarten voorzien, verschenen, terwijl over de pas

ontdekte kusten van Afrika en de nieuwe wereld, zelfs geruimen tijd na hun ontdekking, zooals N. zich uitdrukt (p. 9), slechts "insignificant and scantily illustrated pamphlets" het licht zagen, "whose combined contents would easily find room in a few folio-pages of the editions of Ptolemy.

De verspreiding van Ptolemaeus werk werd voorts niet weinig in de hand gewerkt, toen, met het oog op de geringe kennis, in de 15e eeuw, ook zelfs bij geleerden, van het Grieksch aangetroffen, een latijnsche vertaling daarvan het licht zag. Deze werd het eerst voltooid door Jacobus Angelus, een leerling van den Byzantijn Emanuel Chrysoloras, en wel tegen het jaar 1409 of 1410. Zij werd onder den titel "Cosmographia" (de vertaling van Geographia) in verscheidene copiën verspreid, waarvan nog eenige, bijs. op de bibliotheek te Nancy en op die van den Keizerlijken Staf te St. Petersburg, bewaard bleven. Een andere merkwaardige vertaling is die van Dominus (later tot Donnus en Donis verkort en verbasterd) Nicolaus Germanus. Zij werd tusschen de jaren 1464 en 1471 vervaardigd, is op die van Angelus gebaseerd, doch overigens voorzien van eenige nieuwere kaarten, welke op eenigszins betere wijze geprojecteerd zijn. Het is deze verzameling van manuscriptkaarten, die hoofdzakelijk als prototype der latere atlassen moet aangemerkt worden.

Het zal nu verder niet doenlijk zijn Nordenskiold te volgen bij zijnt beschrijving der bovengenoemde zeven edities, die nog in de 15de eeuw, der 33, die in de 16de, der 16, die sedert de 17de gedrukt werden 1, of bij zijne opsomming der 26 pseudo-edities (werken, die ten onrechte is uitgaven van Ptolemaeus beschouwd werden). Slechts dit zij opgemerkt, dat hij meer geeft dan in de vroegere bibliographische beschrijvingen deze edities door Mr. Justin Winsor 2) en Santarem gevonden wordt, dewij hij, zooals hij uitdrukkelijk verklaart (p. 11), in de gelegenheid was at examining at leisure at (his) own writing-table almost every authentite edition of Ptolemy's geography and thus had been able more completer and minutely than (his) predecessors to compare them especially with regard to the cartography." Ook stelde die vergelijking hem in staat et antwoord te geven op de zoo belangwekkende vragen, welke dier editie. Ptolemaeus eigene kaarten het best terug gaf en in welk opzicht die kaarten be

¹⁾ Wij vermelden hier nog alleen de jongste, sedert 1883 te Parijs verschenen editient Carl Müller met grieksch-latijnschen tekst en een index codicum. Zij zal, voltooid, z deelen tekst en een deel kaarten bestaan.

²⁾ A bibliography of Ptolemy's Geography, Cambridge, Mass. 1884. Verdere her nen voor de bibliographie van genoemd werk geeft Nordenskiöld, p. 11, noot 2.

meest te kort schoten. Wat het eerste punt betreft, komt hij tot de conclusie, dat de oorspronkelijke kaarten van Ptolemaeus het trouwst teruggegeven zijn in Berlinghieri's "Septe Giornale della Geographia", Firenze ca 1478, hoewel die reproductie vol grove drukfouten zit en de kopergravure aan zware technische gebreken lijdt; dat de manuscriptkaarten, overgebracht in een soort van conische projectie, zeer nauwkeurig gereproduceerd zijn in de editie van Bologna, circa 1472 1), al is ook hier de technische uitvoering der kaarten, wellicht het eerst op koper gegraveerd, nog zeer gebrekkig; dat de manuscriptkaarten van Nicolaus Germanus zorgvuldig de oorspronkelijke Grieksche teruggeven, zonder eenige andere wijziging dan de verandering van Ptolemaeus' aequidistante cylindrische projectie in eene projectie met rechtlijnige convergeerende meridianen; eindelijk, dat de kaarten, op koper gegraveerd door Schweinheim Buckink (Romae 1478, 1490, 1507 en 1508) vertrouwbare en onveranderde copies zijn van de oorspronkelijke kaarten van Nicolaus Germanus. Het zijn dan ook deze kaarten (Tabulae I-XXVII), die in den Fac Simile-Atlas zijn opgenomen en ons eerst recht goed in staat stellen de fouten van Ptolemaeus' kaarten, waarop reeds Peschel zoo herhaaldelijk wijst en die door Nordenskiöld nog eens uitvoerig worden besproken en verklaard, als 't ware voor ons zelven na te gaan en recht duidelijk voor oogen te zien. Het zijn de te groote uitgestrektheid der Middellandsche zee en der aan de ouden bekende wereld; de verbinding van Zuid-Afrika met Oost-Azië door een Terra incognita en daarmede de afsluiting van den Indischen Oceaan; de wanstaltige vorm van Voor-Indië en de te groote uitgestrektheid van Ceylon; het gemis van kennis der noordelijke grenzen van het Oostelijk halfrond; de te groote afmetingen van Schotland in Oostelijke richting; de te geringe afstand tusschen Oostzee en de zee van Azof. -

Doch bestonden er dan in het besproken tijdperk in het geheel geene andere gedrukte kaarten of atlassen? Zonder rechtstreeksch verband met de verschillende edities van P. werden vóór 1520 slechts weinige en onbelangrijke kaarten gedrukt, bijv. de wereldkaart en de kaart van Palaestina, die als houtsneden voorkwamen in het te Lubeck (1475) verschenen werk "Rudimentum Novitiorum"; een wereldkaart in de "Pomponii Mellae Cosmographi Geographia" etc., Venetiis 1482, met iets beteren vorm van Scandinavië, doch overigens een reproductie van Ptolemaeus' Mappa mundi; een wereldkaart, gevoegd bij een editie van Macrobius', In Somnium Scipionis Expositio", in 1583 te Brescia verschenen, door

¹⁾ Zie over de quaestie der oudste gedrukte kaarten von Wieser, Mitteil. 1890, p. 272.

Nordenskiold als T. XXXI gereproduceerd; een dito in het werk van Johannes de Sacrobosco (Holywood) "Opusculum Sphericum" of "De Sphera", ved overeenkomende met de voorgaande; een ruwe wereldkaart in den "Ymago mundi" van Petrus de Aliaco, cº 1483 te Leuven verschenen, dox Nordenskiöld als figuur 19 van zijn tekst gereproduceerd en waarvan en exemplaar, door Columbus bestudeerd, nog steeds in de bibliothea Colombina te Sevilla wordt bewaard; een kaart van Germania in Hartmann Schedel's "Liber Cronicarum" en eenige andere, die op de vijze der radkaarten of zoo ruw vervaardigd waren, dat zij nauwelijks den naam van kaarten, in modernen zin genomen, verdienen. Voor zoore deze kaarten eenige gegevens over de nieuw ontdekte gedeelten van Afrika, de Antillen en Amerika bevatten, komen wij er later op terug.-Was tot dusver slechts sprake van gedrukte kaarten, die, naast het werk van Ptolemaeus, in den loop der Midden-Eeuwen ontstonden, en slechts en geringen invloed uitoefenden, datzelfde geldt van de manuscript-kaarten, welke men tot 4 groepen zou kunnen terug brengen: 1°. die der Arabieren welke, uit cartografisch oogpunt bezien, door Nordenskiöld (p. 43) zeer lazg worden gesteld 1); 2°. een menigte van wereldkaarten, soms ten gebruik van het onderwijs samengesteld, in waarde niet hooger dan de radkaarten en huns gelijken staande; 3°. de zeekaarten der Midden-Eeuwen, portolano's, compas- of loxodromische kaarten, zooals wij reeds zagen, zich tot bepaalde gedeelten van de toen bekende wereld beperkende, voor door zeelieden of kooplui samengesteld, en door de geleerden dier dagen over het hoofd gezien of in hun soms groote waarde zeer ten onrechte miskend 2); eindelijk eenige wereldkaarten, op die portolano's gebaseerd,

¹⁾ Various admirable descriptions, segt hij, of distant lands and of extensive voyage, written by Arabian scholars, far surpassing the geographical productions of the same pand among the Christians, are also still extant. [Zie daarover het voortreffelijke artikel vaprof. de Goeje, Tijlschr. Aardr. Gen., Dl. I, p. 190]. But similar perfection was new attained by the Arabian maps, which, if they were original drawings and not, as the planisphere of Edrisi, mere copies or reproductions from Ptolemy, are not only far inferior to the maps of the Alexandrian geographer, but not even comparable to the Equimau-sketches, brought home by English and Danish polartravellers from their deserts of the polar regions. They have not exercised any influence upon the development of cartography and none on the mapprinting of the 15th and 16th century. Veverder de door N, p. 44, geciteerde getuigenissen van Vivien de St. Martin, Lelews, Mehren en anderen, die allen in denzelfden geest luiden.

²⁾ Sebastian Münster schijnt ze geheel over het hoofd gezien te hebben, en ook 0telius vermeldt, althans in den »Catalogus Auctorum" der eerste editie van zijn Thetrum geen enkelen vervaardiger dier portolano's.

waarop Europa, Azië en Afrika te zamen een breed, cirkelvormig eiland vormen met Jeruzalem ongeveer in het midden, voor de Zuid-Europeesche zeeën vrij nauwkeurig, doch voor de overige deelen der aarde verre bij de kaarten van Ptolemaeus achter staande. Slechts de kaarten van Marino Sanudo uit het begin der 14e eeuw, die van Andrea Bianco (1436) en die van Fra Mauro (1457) maken daarop voor een gedeelte een gunstige uitzondering. —

Wij nemen hiermede afscheid van het tijdperk, waarin de invloed van den Alexandrijnschen geograaf zoozeer overheerschend was, en gaan thans na, welke verbetering de kaart onderging, toen de kennis der aarde zich verder uitstrekte dan in Ptolemaeus' dagen, of van dat deel, wat in zijnen tijd als bewoonde aarde (Oikoumene) werd voorgesteld.

Om dit goed in het licht te stellen, moeten wij thans nog even op de straks genoemde portolano's terugkomen. Wij zullen daarna de kaarten en globes bespreken, welke die nieuw ontdekte gedeelten der aarde, in soms geheel nieuwe projecties, voor oogen stelden en op die wijze den overgang vormden tot de kaarten en kaartwerken, welke een nieuwe periode in de cartographie openden: het tijdperk van Ortelius, Mercator en anderen.

Wat de portolano's betreft, in aansluiting aan de meening, door de Italiaansche geleerden en prof. Fischer over deze geuit, verklaart Nordenskiöld ze voor "unsurpassed masterpieces" en "most important contributions to cartography during the middle-ages", zich onderscheidende door een zoo nette en zorgvuldige teekening der kusten, dat men deze de "portolano-style" zou kunnen noemen. Doch overigens verschilt N. ten opzichte dier portolano's niet weinig in meening van zijne voorgangers. Vooreerst acht hij den nieuwen naam, voor deze uitgevonden, nl. "loxodromic charts", volstrekt niet verkieslijk boven den ouden (portolano's), evenmin als dien van compaskaarten, "it being by no means proved that these charts were originally constructed by compassbearings." Vele dier kaarten zijn verklaard ouder dan het gebruik van het compas aan boord der schepen. Beteekent het woord "portolano" zoowel "zeilaanwijzing" als "kaart" en heest men om die dubbele beteekenis bezwaar tegen het gebruik van het woord, ook het woord "kaart" komt in verschillende talen meermalen met dubbele beteekenis voor, terwijl dit bezwaar bovendien gemakkelijk kan opgelost worden door den term "portolaan-kaarten" te bezigen.

Doch belangrijker is het verschil met zijne voorgangers, als hij in het licht stelt, dat wel degelijk enkele dezer portolano's, nl. die der Zwarte-

en Middellandsche zee (wat Fischer ontkent) gedrukt zijn. Vooreerst zijn vek der gedrukte Tabulae novae, by Ptolemaeus' edities gevoegd, gebaseerd op die portolano's 1). Doch een nog beter bewijs levert daarvoor een kaat dier zeeën en van de Canarische eilanden, te Antwerpen op koper gegraveerd, en gepubliceerd in "de Nieuwe beschrijvinghe ende Caert-Boeck van de Mitlandsche Zee" etc. door Willem Barentszoen, in 1595 te Amsterdam gedrukt 2).

Die kaart is volgens Nordenskiöld "a copy of a Mediterranean portolano from the beginning of the 14th century", wat gemakkelijk kan aangetoond worden uit een vergelijking van Barents kaart met de portolano van Dulcert (1339). Daartoe worden beide kaarten dan ook, resp. onder fig. 21 en 16, in den tekst van den Fac simile-Atlas gereproduceerd. Ook blijkt het uit een vergelijking van de legenda's, op de portolano's en op Barents kaart voorkomende en van deze op van Keulen's zeekaaren (1681–1722) overgegaan.

Een derde eigenaardige meening uit Nordenskiöld ten opzichte van het ontstaan dier portolano's. Hoewel hij erkent, dat te dezen nog ernstiger studie van de geschiedenis en geographie der Midden-Eeuwen zal moeten gemaakt worden, vooral van het tijdperk der kruistochten, om den oorsprong der namen op deze portolano's en daarmede hun ontstaan te kunnen verklaren,

¹⁾ Nordenskiöld noemt de volgende kaarten (tekst, p. 49 en 50) als »based on portelanes or drawn according to the principles adopted to the portolano-makers, although generally without any compass-lines or loxodromes, published during the 16th century: de Orbis typus universalis etc., gedrukt in verschillende edities van Ptolemaeus (1513. 20, 22, 25, 35 en 1541); twee portolanos van Afrika in die van 1513 en 20, op gereduceerde schaal in latere edities; de Tabula Nova Asiae Minoris en de Tabula moderna Indiae in dezelfde edities; een kaart in de "Arte de Navegar" van Pedro & Medina, in 1545 in Spanje gedrukt en later herhaaldelijk herdrukt; de Carta Marina Now. als een illustratie gevoegd bij een nota over zeekaarten in den Ptolemaeus van Russik Gastaldi, in 1548 te Venetie verschenen en later in de edities van 1561, 62, 64 en 74 herdrukt: verschillende kaarten van gedeelten der Middell. zee, in Italië gedrukt, reck streeksche reproducties van portolano's, slechts voor een gedeelte in Lafreri's Atlas, waarover later boven meer, opgenomen; kaarten in Waghenaer's Spieghel der Zeevaard, sevidently based on Italian or Catalan portolano's and partly on ancient -Sailing directions for the Baltic"; eindelijk Willem Barentszoon's »Caertboeck", boven besprokes. Ook voor de bovengenoemde kaarten van Sanudo, Bianco en Fra Mauro »the portoknos served as starting points" (N., p. 51).

²⁾ Het geheele werk bevat 10 op koper gegraveerde kaarten en zeer vele kustgezichten in houtsnee. De kaarten zijn allen geteekend: "Willem Barentszoen" en gedeteerd 1593—95.

kan hij toch niet meegaan met Fischer en anderen, als deze beweren, dat hun oorsprong in het midden der 13de eeuw moet gesteld worden en dat de Grieken en Romeinen waarschijnlijk geen zeekaarten (itineraria maritima) voor praktisch gebruik zouden gekend hebben. Naar zijne meening waren de door Ptolemaeus beschreven en beoordeelde werken van Marinus van Tyrus een verzameling van zeekaarten, met tekst, telkens verbeterd en geheel voor praktische doeleinden ingericht. Dat zij, hoewel niet tot onzen tijd, toch tot diep in de Midden-Eeuwen bewaard zijn gebleven, blijkt z i. uit het feit, dat de Arabische geograaf Masudi verklaart ze gezien te hebben en ze hooger stelt dan die van Ptolemaeus. Overigens waren de kaarten van Middellandsche en Zwarte Zee, door den laatsten aan Marinus van Tyrus ontleend, toch reeds zoo volledig, dat de omtrekken (delineations) der genoemde zeeen op de portolano's zeer wel van Ptolemaeus' kaarten konden overgenomen worden, natuurlijk onder het aanbrengen van langzaam voortgaande verbeteringen. Het is dezelfde wijze van teekenen; het cartographische alphabet is op beiden hetzelfde; zuiver Ptolemaeische voorstellingen, bijv. die van den loop van den Don, worden op de portolano's, bijv. op die van Dulcert, aangetroffen. "It we further", zoo eindigt N. zijn betoog, "consider that the outlines of these seas on all other independent maps (nl. van die van Ptolemaeus) of the middle-ages were disfigured, so as not to be recognizable, it seems to me highly probable that the first origin of the portolano's is to be derived from the Tyrian charts, described by Ptolemy under the name of Marinus.

Tot zoover over de portolanos, die het meest de vermeerderde kennis van Zuid-Europa en West-Azië voor oogen stelden. —

Wat het hooge Noorden betreft, het is bekend en ook uit de facsimile-kaarten gemakkelijk te zien, dat de grenzen der aan Ptolemaeus bekende wereld (oikoumene) niet veel verder dan 63° N. B. reikten; dat deze parallel in N. W. Europa over het eiland Thule en door den Oceanus Hyperboreus loopt; dat de noordgrenzen van Duitschland en het Cimbrische schiereiland (Jutland) nog goed te herkennen zijn, maar dat, in plaats van het Scandinavische schiereiland, twee eilanden op de kaart worden aangetroffen: Scandia en Thule, zich ca 150 kil. van O. naar W. uitstrekkende, terwijl tusschen deze en het veel te oostelijk gelegen noordelijk deel van Schotland nog 30 "Orcades Insulae" en 3 "Scandiae Insulae" aangetroffen worden.

Natuurlijk kwam men in Zuid-Europa uit den mond der Noordsche volken, die zich verplaatsten, en door de tochten der Vikings spoedig te weten, dat deze voorstelling op de kaarten van Ptolemaeus alles behalve juist was. Om deze leemte aan te vullen moesten dus in den loop der Midden-Eeuwen nieuwe onderzoekingen ingesteld en nieuwe kaarten samengesteld worden. Op de bovengenoemde kaarten van Dulcert, de Carte Catalane van 1375 en Andrea Bianco's wereldkaart vindt men dan ook reeds opgenomen, wat de zeelieden, die benoorden en beoosten de Schelde voeren, op hunne portolano's hadden opgenomen, of van de schippers der Oostzee waren te weten gekomen. Gothland speelt daarop een hoofdrol, even als Novgorod en eenige andere plaatsen, waarmede dit eiland in handelsbetrekking stond. De Oostzee, Gothland en Scandinsvië, alles strekt zich van O. naar W. uit; de Noorweegsche bergen staan aangewezen, ja ten W. van Noorwegen komen landen en eilanden voor, met bijschriften, waaruit blijkt, dat Groenland en IJsland niet onbekend waren aan de zeevarenden, uit wier berichten de oorspronkelijke kaat werd samengesteld, die zonder twijfel veel minder zorgvuldig geteekend werd dan de zuidelijke portolano's. Zij zal meer aan de cartographische voortbrengselen der Arabieren hebben doen denken.

Overigens mag die ruwere voorstelling der oorspronkelijke kaart et. volgens Nordenskiöld, volstrekt niet toe leiden (p. 53), om met prof. Theobald Fischer aan te nemen, dat die voorstelling op de noordsche portolano's niet gebaseerd zou zijn geweest op eigen waarneming, maar op verhalen, door zeevaarders, uit Zuid-Europa afkomstig, bijeenverzameld, als zij de zeelniof schippers uit het N. aan den Scheldemond ontmoetten. Juist het ruwe en vormlooze karakter dier kaarten, eeuwen lang onveranderd gebleven, bewijst, dat zij copies waren van één gemeenschappelijk prototype, slechts allengskens door geslachten van kaartenmakers gewijzigd. Zij moet samengesteld zijn door een Scandinaviër of door een vreemdeling, die Scandinavië had bezocht.

Naast deze tot dusver onbekend gebleven prototype der portolano's hebben het eerst een betere voorstelling van het Noorden gegeven: een kaart van het Scandinavische schiereiland, IJsland en Groenland, vervaardigd, vóórdat nog de Noordsche zeelui met het gebruik van het compas bekend raakten, waarschijnlijk in het begin der 13de eeuw. Ook die kaart ging verloren maar een denkbeeld, bij benadering, kan er van verkregen worden, ak men de meer of min gewijzigde reproducties nagaat, zooals deze gevorden worden in de Brusselsche editie van Ptolemaeus, tusschen 1480 et '85 uitgegeven, en in die, welke tegen 1467 het licht zag, aanwezig op de majoraatsbibliotheek-Zamoisky te Warschau, zoo geheeten naar der stichter dier bibliotheek Johannes Zamoisky, in 1589 poolsch kanselier.

Groenland is op deze kaart niet ten N., maar ten W. van Noorwege

geplaatst, tusschen 62° 30' en 71° N. B. De hoofdvorm van Groenland is verwonderlijk juist en meer overeenkomstig de werkelijkheid dan die, welke aan Scandinavië op alle kaarten vóór die van Olaus Magnus gegeven wordt. Men zou gelooven, dat de vervaardiger de onbegaanbare ijsmassa's en bergen, die soms tot de kust reiken, gekend heeft, terwijl bij de N. W. kust geschreven staat: "Mare, quod, frequenter congelatur. Ultimus terminus terrae habitabilis": een opmerking, die, volgens Nordenskiöld eigen aanschouwing bewijst, daar de zeelieden van dien tijd, tenzij in het Kattegat, geen bevroren zeeën hadden leeren kennen.

Behalve deze twee prototypen bestond er, als derde, een groote kaart van Denemarken en Zuid-Zweden, vervaardigd door een zekeren Claudius Clavus, helaas! al weder verloren gegaan. Toch kan men zich ook van die kaart eenige voorstelling maken, wanneer men de op de bibliotheek te Nancy aanwezige editie van Ptolemaeus, in het jaar 1427 voltooid, raadpleegt. Daarin komt niet enkel een reproductie dier kaart op verkleinde schaal voor, maar tevens een beschrijving 1).

1) Het hier bedoelde latijnsche handschrift van Ptolemaeus' Geographia, reeds vroeger vermeld, werd waarschijnlijk vervaardigd voor kardinaal Filiastrus, die niet enkel de bedoelde kaart van het Noorden er bijvoegde, maar ze ook beschreef, als bevattende «Sarmatiam Europae, vel illas regiones quae sunt ab Germania ad septentrionem versus Orientem, in quibus est Polonia, Pruthia, Lituania et aliae amplae regiones usque ad terram incognitam ad septentrionem partem Daciae et Tauricam Chersonesum usque ad paludem Meotin; et ibi Thanais fluvius qui dividit Europam ab Asia in parte septentrionali et versus orientem. - Item continet, ultra quod ponit Tholomeus, Norvegiam, Suessiam, Rossiam utramque et sinum Codanum, dividens Germaniam a Norvegia et Suessia. Item alium sinum ultra ad septentrionem, qui omni anno congelatur in tercia parte anni. Et ultra illum sinum est Grolandia, quae est versus insulam Tyle magis ad orientem. Et ita tenet totam illam plagam septentrionalem usque ad terram incognitam. De quibus Tholomeus nullam ferit mentionem et creditur de illis non habuisse noticiam. Ideo haec octava tabula est multo amplior describenda. Propter quod quidam Claudius Cymbricus illas septentrionales partes descripsit et fecit de illis tabulam quae jungitur Europae et ita erunt 11."

Op de tiende kaart van Europa staat verder geschreven: "Haec descriptio et tabula sunt a quodam Claudio Cymbrico", terwijl in de geographische beschrijving van Scandinavië, in den tekst van Ptolemaeus ingelescht, gelezen wordt, en wel bij het eîland Fünen (Odhonis insula): "in qua parte est Salinga, patria villa Claudii Clavi, Svarthonis Melis Petri Tuchonis fili" etc. Volgens N. zou deze Deen Claudius Clavus, de maker van kaart en inlassching in den tekst van Ptolemaeus, in overeenstemming met het onderzoek van prof. Erslev, niemand anders zijn dan de Deensche mathematicus Claudius Niger, die, waarschijnlijk in 't begin der 15e eeuw, voor den Deenschen koning een kaart maakte, welke op veel verkleinde schaal in den codex van Nancy werd opgenomen. (p. 54).

Op deze drie prototypen, die in 't begin der 15de eeuw waarschijnlijk nog bestonden, en twee kaarten van Ptolemaeus (zijne algemeene en die van Europa) berustten alle voorstellingen van Noord-Europa, die tot aan het jaar 1532 het licht zagen, ook die van Nicolaus Germanus, door Nordenskield in zijn werk over de reis der "Vega" gepubliceerd; voorts de kaart, welke in 1513 het licht zag en door Lelewel als "Charta Marina Portugalensium" wordt gereproduceerd; die van Ruysch, welke in 1507 het eerst verscheen, doch later in andere kaartwerken werd overgenomen en van zoo grooten invloed was op de voorstelling van het poolbekken, zooals deze bij Mercator en anderen wordt aangetroffen: eindelijk ook de kaarten der gebroeders Zeno, die in de laatste jaren zoo dikwijls ter sprake kwamen. Om hun groot belang geeft N. dan ook in den tekst (p. 61) van deze prototypen een reproductie op kleine schaal

In het genoemde jaar 1532 verscheen echter een nieuw type. Zij was afkomstig, volgens de verklaring van Jacobus Ziegler, beijersch theoloog, die haar in zijn werk reproduceerde, van 4 Scandinavische prelaten, die, tegelijk met hem, te Rome waren geweest, en aan wie ook de bijzonderheden over "Gronlandiae Chersonesus et insula Tyle" en andere gedeelten van Noord-Europa zijn ontleend, die in het werk voorkomen. Voor Scandinavië geven tekst en kaart vele nieuwe bijzonderheden: het gebergte, de groote meren zijn vrij goed voorgesteld; Finland wordt het eerst op de kaart gebracht; Groenland en IJsland zijn minder nauwkerig dan op de kaart van Zamoisky aangegeven; op Groenland komt slechts één naam voor, nl. van een hoogen berg op de Oostkust, "Hvetsargi promontorium" geheeten.

Eindelijk verscheen zeven jaar na Ziegler's werk de kaart van Olass Magnus, in 1539 te Venetië gedrukt en met een inleiding voorzien Die kaart, de grootste gedrukte kaart van het Noorden, in negen folio bladen, schijnt weinig bekend geworden te zijn noch beschreven. Men raadpleegde die van Ziegler of de kaart, welke eerst in 1554 in zeer gereduceerden vorm bij het werk van Olaus Magnus zelven 1) of bij dat van Johannes Magnus 2) gevoegd werd. Zooals bekend is, werd de echte kaart van 1539 eerst in 1886 door Dr. Oscar Brenner te Munchen terug gevonden. Zij bevat tal van ethnographische en geographische détails en is een zoo fraaie houtsneê, dat zij volgens Dr. Brenner uit artistisch oogpunt bijna door geen andere houtsneêkaart overtroffen werd.

¹⁾ De omnibus Gothorum Sveonumque regionibus Historia, Romae 1554.

²⁾ Historia de Gentibus septentrionalibus, Basel 1567.

Zij is op haar halve grootte door Nordenskiöld in den tekst gereproduceerd (figuur 32), doch zag in haar natuurlijke grootte, hoewel in slechts weinig exemplaren, te Stokholm het licht.

Tot zoover over de kaarten van het hooge Noorden 1).

Wat de gedrukte kaarten van de nieuwe wereld en de nieuw ontdekte gedeelten van Afrika en Azië betreft, het is zeker opmerkelijk, dat, evenals de publicaties over het nieuw ontdekte Amerika, tusschen 1492 en 1551 verschenen²), van zoo weinig beteekenis zijn, ook de manuscriptkaarten, doch vooral de gedrukte kaarten, in genoemd tijdperk zeer schaarsch moeten genoemd worden. Wat de manuscriptkaarten betreft, het is mogelijk, dat vele dezer voor gouvernementen of handelaars vervaardigde kaarten opzettelijk geheim gehouden zijn en vervolgen in het stof der archieven te gronde gingen — misschien later nog voor den dag zullen komen —, voorshands kennen wij daarvan slechts de in 1832 in de bibliotheek te Weimar teruggevonden kaarten der Nieuwe wereld van 1527 en 29; de door von Humboldt in de verzameling van Baron Wal-

¹⁾ Hoogst merkwaardig is het gedeelte van prof. von Wieser's artikel, betrekking hebbende op deze Noordsche kaarten (p. 275 en verv.). Nadat hij heeft opgemerkt dat de door N. ontdekte (boven besproken) kaart uit de Zamoisky-bibliotheek, even als die der gebroeders Zeni, hetzelfde origineel ten grondslag hebben, deelt hij mede dat hij in de bibliotheken te Florence niet minder dan drie manuscriptkaarten heeft gevonden, die met de Zamoisky-kaart, afgezien van eenige onbelangrijke details, volkomen overeenstemmen. De bedoelde Tabula Regionum Septentrionalium zal dus ook nog wel in vele andere handschriften, meer bepaald in de codices van Ptolemaeus der 15de eeuw, voorkomen. - Nordenskiöld had voorts als zijne meening geuit, dat zoowel de Zamoiskykaart als die, welke in de editie van Ptolemaeus (Ulm. 1482) voorkwamen, gebaseerd waren op een noordsche oorspronkelijke kaart (zie boven), die in een tijd ontstaan moest zijn, toen de Noordsche zeelui nog niet met het kompas bekend waren, "misschien in 't begin der 13de eeuw". Op een der drie gevonden kaarten vond prof. von Wieser nu het volgende aangeteekend: Liuonia nouiter per prutenos fratres ad christi fidem conversa se extendit ad boream". Deze aanteekening wijst volgens hem bepaald op de 13de eeuw. De bekeering der Lijflanders begon ce 1200; in 1287 verbonden zich de ridders der Duitsche orde met de Zwaardridders van Lijfland en onderwierpen ge heel Lijfland, Koerland en Estland, "Wir stehen also", aldus eindigt prof. von Wieser zijn betoog, "vor der interessanten Thatsache, dass man im Norden Europa's Kartenbilder von überraschender Treue zu entwerfen verstand in einer Zeit, aus der uns sonst abgesehen von den Portulani der Italiener und Katalanen - nur schematische Radkarten und rohe Routenkarten erhalten sind".

Door Mr. Harrise opgesomd in zijn Bibliotheca Americana vetustissima, New-York 1866, Additions, Paris 1872.

kenaer aangetroffen kaart van Juan de la Cosa of Juan Biscaino, den metgezel van Columbus op zijn tweede reis, te Puerto de Santa Mana in 1500 vervaardigd; de aan Hercules d'Este, hertog van Ferrara, door zijn gezant te Lissabon, Alberto Cuatino, tusschen 1501 en 1505 toegezonden kaart; de manuscriptkaart der nieuwe wereld van 1503, toegeschreven aan Salvat de Palestrina; die van 1505, toegekend aan Pedro Reinal, en enkele anderen.

Wat de gedrukte kaarten betreft, de eerste teekeningen of bijschriften, betrekking hebbende op de reizen der Portugeezen en voorkomende op een gedrukte kaart, worden gevonden op die, welke behoort bij Reisch's "Margarita Philosophica", in 1503, en dus 56 jaar na die eerste reizen de Portugeezen verschenen. De eerste gedrukte kaart der nieuwe wereld zag het licht onder den titel: "Nova et universalior Orbis cogniti tabula, Joa. Ruysch Germano elaborata," Romae 1508, en wel onder de Tabulae novae van de in datzelfde jaar te Rome verschenen editie van Ptolemaeus. Die kaart van Ruysch verdient niet enkel, als eerste gedrukte kaart der nieuwe wereld, maar ook om vele andere redenen meer bijzonder onze aandacht.

Vooreerst staat daarop bij Taprobane aangeteekend: "Ad hanc Lusitani nautae navigarunt anno Salutis MDVII," wel een bewijs, dat door Ruysch ook de nieuwste berichten aangaande de Portugeesche reizen terstond waren opgenomen. Doch in de tweede plaats wijkt die kaart van Ruysch in zeer vele opzichten belangrijk van de voorstellingen, door Ptolemaeus gegeven, af. Afrika met vele der naburige eilanden worden er zooveel juister op voorgesteld: het eerste, door den Oceaan omgeven, met het zuidelijk deel op ten tennaasten bij juiste breedte; Indie als een drichoekig schiereiland, van Afrika gescheiden, door Indus en Ganges in 't N. begrensd; Ceylon juister van vorm en ligging; de Oostkust van Azie, niet volgens de voorstellingen van Marinus van Tyrus, een duizend jaz geleden, maar naar de zooveel jongere berichten van Marco Polo, met bijvoeging van nieuwe gedeelten, als "Asia extra Ptolemaeum", of "Asia Marci Pauli Veneti", ver buiten de oostelijke grenzen van de bovengenoemde Oikoumene van Ptolemaeus.

Voorts wordt de Middellandsche zee van 62 lengtegraden tot 53 ingekrompen; ontvangt Noord-Schotland een juisteren vorm; wordt, zoor's gezegd, de nieuwe wereld het eerst op een gedrukte kaart voor ooger gesteld en is Groenland voor het eerst niet met Europa door een uitgestrekt poolland verbonden. Voegt men daarbij hoogst merkwaardige legenda's en bijschriften, betrekking hebbende op het gebruik van het kompas in het hooge Noorden 1); op het verdwijnen van een eiland tusschen IJsland en Groenland 2); op de "Insula Daemonum", waar een gevecht tusschen de Eskimo's en de oudste Groenlandvaarders schijnt plaats gehad te hebben; op het "Insula Antilia" tusschen 37° en 40° N. B 3); op Zuid-Amerika, waaruit blijkt, dat Portugeesche zeelui tot 50° Z. B. de oostkust volgden, zonder haar zuidelijk uiteinde te bereiken — dan laat het zich verklaren, dat Nordenskiöld onzen Ruysch, behoorende "to an old noble family in the Netherland", een plaats geeft onder de hervormers der cartographie en zoo gaarne meer over zijn leven en werken zou willen weten dan hij heeft kunnen gewaar worden 4).

Naast deze kaart van Ruysch zijn nog ruim 10 oude gedrukte kaarten te vermelden, bij welke wij slechts korter kunnen stilstaan. Het zijn een kaart van Afrika, in 1508 te Milaan gedrukt, de titelplaat vormende van het werk "Itinerarium Portugalensium e Lusitania in Indiam" etc., een vertaling van het in 1507 te Venetie gedrukte werk "Paesi nouvamente retrovati". De hier bedoelde kaart (in den tekst, p. 66, gereproduceerd), vormde, naar het schijnt, vele jaren lang de prototype der nieuwere kaarten van Afrika. Voorts een te Straatsburg in 1509 als titelplaat voor het werk "Globus mundi" gedrukte wereldkaart van zeer geringe waarde (tekst, fig. 21); een in sommige edities van het werk "P. Martyris angli mediolanensis opera" (1511) ingelaschte kaart van West-Indie (tekst, fig.

^{1) &}quot;Hic compassus navium non tenet", zoo luidt het begin der legenda.

²⁾ Volgens N. waarschijnlijk op een vulkanische uitbarsting ten W. van IJsland doelende.

³⁾ Nordenskiöld teekent over dit eiland het volgende aan (p. 65): "It is called Antilia Insula, and a long legend asserts that it had been searched for in vain, but that it has been discovered long ago by the Spaniards, whose last Gothic king, Roderik, had taken refuge there from the invasion of the Barbarians. The inscription depends on a myth, which has played a certain part in the history of geography and from which is derived the present name of the islands between Florida and the northern coast of South America. The earliest delineations of an island Antilia in the Atlantic Ocean are found on a portolano of 1425, belonging to the Library of Weimar, and on Andrea Bianco's map of 1436. On the globe of Behaim, to the south of the Azores, an island of the same name is also represented, provided with a long inscription, corresponding, but not identical with the legend of Ruysch".

⁴⁾ Terecht heest Prof. von Wieser in het licht gesteld (zie Mitteil. 1890, p. 273, noot 1, p. 274, noot 2 en p. 275, noot 1), welke verdiensten ten opzichte van het in kaart brengen der nieuwe ontdekkingen den Duitschen kosmograaf Martin Waldseemüller (Hylacomylus) toekomen, die ook reeds in het begin van 1507 een groote wereldkaart uitgaf, waarop die ontdekkingen stonden aangegeven. Overigens worden daardoor de verdiensten van Ruysch in geen enkel opzicht verminderd.

38), de eerste, welke het achterdochtige Spaansche gouvernement van de nieuwe wereld het licht deed zien en waarschijnlijk ook wel de eerste in Spanje gedrukte kaart; een kaart in de editie van Ptolemaeus, door Bernardus Sylvanus bezorgd (1511), "cum additionibus locorum nuper inventorum", waarop o. a. naar de ontdekkingen van Corte Real nog aan gene zij van Labrador verwezen wordt, Groenland als met Azie verboeden, Cuba als een groot eiland en Zuid-Amerika als een groot continent, in het W. nog onbekend, worden voorgesteld; een kleine kaart in de editie van Aristoteles werken, in 1512 te Neurenberg uitgegeven, waarop nou genomen is van de Portugeesche ontdekkingen; de wereldkaart van lohannes Stobnicza, in 1512 te Krakau verschenen; een ruwe houtsnede, behoorende bij het werk "Introductio in Ptolemaei Cosmographiam", doch van groot belang, omdat daarop vooreerst Noord- en Zuid-Amerika, als twee groote continenten, verbonden door een lange smalle landengte, worden voorgesteld, en verder, dewijl op deze kaart, nog een jast voordat Balboa van de bergen der landengte van Darien de "Mare del Sur" aanschouwde (25 Sept. 1513), gebroken wordt met de voorstelling dat Europa, Azie en Afrika door een enkelen oceaan worden omgeven Op deze kaart is de zee tusschen Europa en Azië door het nieuw ontdekte Amerika in twee bijna gelijke oceanen verdeeld, alleen in 't hoogt N. en Z. met elkander in gemeenschap staande. Die zuidelijke gemeenschap wordt niet bepaald aangegeven, dewijl de ruimte op de kaart ontbreekt, maar de kusten loopen zoo naar elkander toe, dat daaruit de meening van den samensteller over die gemeenschap duidelijk kan worden opgemaakt. Ook komt op deze gedrukte kaart voor het eerst de naam Mardagascar voor.

Verder moeten hier nog vermeld worden vijf nieuwe kaarten, bevattende de jongste ontdekkingen van Spanjaarden en Portugeezen, opgenomen onder de 20 nieuwe, die als supplementen bij de editie van Ptolemaeus, in 1513 uitgegeven, gevoegd werden. Twee daarvan zijn door N. als T. XXXV en XXXVI in den atlas gereproduceerd, nl. de Hydrographia, sin Charta Marina, continens typum Orbis universalem juxta Hydrographorum traditionem, en de Tabula Oceani Occidentalis seu Terrae novae: twee kaarten van Afrika en een van Zuid-Azie zijn in den tekst, fig. 8—10, opgenomen. De in 1501 en 1502 ontdekte eilanden Ascension en St. Helena komen hier het eerst voor onder den naam "Y tebas." De kusten van Afrika zijn zoo nauwkeurig opgenomen als die der Middellandsche zee op de portolano's. De voorstelling van de beide Indische schiereilanden laat nog veel te wenschen over. — Eindelijk moet hier nog

le kaart genoemd worden, die in Reisch's "Margarita Philosophica" (nl. in de editie, welke in 1515 het licht zag, en dus niet in die van 1503) gevonden wordt. Op het Zuidelijk deel dier kaart toch komt voor het eerst de naam Paria seu Prisilia voor op de plaats, waar nu Brazilië gelegen is. Op het noordelijk deel vindt men er den naam "Zoana Mela", zooals von Wieser in het Zeitschr. f. wisschensch. Geographie (1885), p. 1, heeft aangetoond, de Italiaansche vorm voor Juana of Johanna, den naam, door Columbus op zijn eerste terugreis aan een der West-Indische eilanden gegeven. Daar de m en de letters in op de kaart meermalen op de zelfde wijze geschreven worden, kan mela bij vergissing voor insula geplaatst zijn. —

Was tot dusver slechts sprake van kaarten, waarop de nieuwe ontdektingen werden voorgesteld, een belangrijk nieuw hulpmiddel was ter hand genomen om op de aarde, als een bol voorgesteld, de juiste ligging van landen en werelddeelen tegenover elkander beter te doen uittomen. Dat hulpmiddel was de globe, waaraan door den bewerker van len Facsimile-Atlas terecht een afzonderlijk hoofdstuk geschonken wordt.

De aardglobes, die in de 15de en in het eerste gedeelte der 16de eeuw werden samengesteld, kunnen, volgens N., in zes groepen worden verleeld. Tot de eerste, die nog zonder eenige kennis der nieuwe wereld werden vervaardigd, behooren die van Martin Behaim van het jaar 1492, in den tekst, p. 12, naar de reductie in Doppelmayer's beschrijving van lie globe ') gereproduceerd, en de globe van Laon, in den tekst (p. 73) naar de reproductie van d'Avezac teruggegeven. De eerstgenoemde, de pudste globe, is volgens teekening en legenda's geheel gebaseerd op Ptoemaeus Atlas, de berichten van Marco Polo en van andere middeneuwsche reizigers in Azië, de portugeesche ontdekkingsreizen en de taart van Noord-Europa in de Ulmer editie van Ptolemaeus van 1482. De globe van Laon, in 1493 vervaardigd en in 1860 in den winkel van een handelaar in oudheden aldaar ontdekt, werd door d'Avezac in het Buletin de la Société de géographie de Paris van 1860 uitvoerig beschreven. Zij schijnt grootendeels naar die van Behaim vervaardigd te zijn.

Tot de tweede groep behooren de globes, van 1492 tot 1515 vervaardigd, lus nà de ontdekking der nieuwe wereld, maar voordat het bestaan van een groot Zuidpoolland werd aangenomen. Daartoe dient men te rekenen: de cleine globe van Lenox, tegen het jaar 1510 vervaardigd, in 1855 te Parijs

¹⁾ J. G. Doppelmayer, Historische Nachricht von den Nürnbergischen Mathematicis und Künstlern, Nürnberg 1730.

door Richard Hunt teruggevonden, een zekeren James Lenox aangeboden, door da Costa en Gabriel Gravier beschreven 1) en als eerste globe, nà de reizen van Columbus vervaardigd, merkwaardig; een we reldkaart in globestrooken, door Ludovicus Boulenger in 1514 vervaardigd strooken, waarop voor het eerst de naam Amerika voorkomt, en die als kopergravure gevoegd werden bij het werk "Cosmographiae introductio Insuper quatuor Americi Vespucii navigationes', in genoemd jaar door Johannes de La Place gedrukt en in 1881 door den antiquar H. Tross ten verkoop aangeboden (Zie Nordenskiöld T. XXXVII) 17; een door N. zelven gevonden wereldkaart in strooken, geplakt op de omme zijde van een kaart van Zwitserland in een editie van Ptolemaeus van het jaar 1525, waarvan hij in 1884 in het tijdschrift "Ymer" de facsimik en eene beschrijving gaf. Zij is waarschijnlijk tusschen 1511 en 15 vervaardigd, stelt Zuid-Amerika voor als op Strobnicza's kaart en mist Terra Australis bezuiden Amerika. — Tot deze groep behoort ook nog de globe, in de collectie van Hauslab gevonden, door Luksch beschreven 3), tegen het jaar 1513 vervaardigd en waarschijnlijk een der oudste door Schoner vervaardigde globes of zijn prototype.

De 3º groep bevat globes, tusschen 1515 en 23 samengesteld, dus vóórdat de resultaten van Magalhaes' reis bekend werden, doch na het brengen of terugbrengen van het Zuidpoolland op de kaarten. Daartoe behooren de globes, tusschen 1515 en 20 door Schoner vervaardigd, en die, welke aan Leonardo da Vinci wordt toegekend. De laatste is door Major beschreven) en heeft, daar de strooken onder de teekeningen van da Vinci gevonden zijn en op die strooken het eerst een Zuidpoolland voorkomt, eenig gewicht. Van veel grooter beteekenis zijn echte de bekende globes van Schoner, waarvan de eerste in 1515 verscheen, te gelijk met een werkje van dezen beroemden cosmograaf en mathematicus, waaruit blijkt, dat nog vóór de samenstelling dier globe een peblicatie het licht zag onder den titel "Copia der Newen Zeitung aus Pre-

¹⁾ Bulletin de la Société Normande de géographie 1870.

^{2,} De reproductie beslaat twee folio bladzijden, ieder van twaalf strooken. Op de bladzijde links staat het onderschrift: -Boulenger 1514"; op de andere: -Mappa musé ad globum inducendum lustro tertio seculi XVI in lignum incisa".

³⁾ Zwei Denkmale alter Kartographie (Mitteil, der K. K. geogr. Gesellsch., Wist 1886, p. 364).

⁴⁾ Memoir on a Mappemonde by Leonardo da Vinci, being the earliest map hithers known containing the name of America; now in the royal collections at Windser. London 1865.

illg Landt', waarschijnlijk een rapport, geschreven door een te Lissaon gevestigd agent aan zijn patroon, den chef van het groote handelsnuis Welser te Augsburg, namelijk van een reis, welke twee portugeesche
schepen door een straat bezuiden Presill hadden afgelegd. Op dat rapport berust dan de voorstelling van de bovengenoemde "terra Australis",
tie het eerst op Schoners globes voorkomt, doch later tot diep in de
18de eeuw op bijna alle kaarten bestaan bleef. Dat deze op Schoners
globe aangegeven straat op Magalhaes' onderneming van invloed is geweest, wordt door Nordenskiöld helder in het licht gesteld. De spaansche
geschiedschrijver Herrera verzekert uitdrukkelijk, dat Magalhaes den bisschop van Burgos een globe vertoonde, waarop zulk een zeestraat voorkwam, en Pigafetta bericht dat de kloeke Magalhaes juist zoo zeker van
't welslagen zijner reis geweest was, omdat Martin Behaim, de zoon,
waarschijnlijk insgelijks een cosmograaf (de vader stierf reeds in 1506)
hem op een zeekaart zulk een passage bezuiden Amerika had laten zien. —

Een vierde groep van globes, samengesteld na Magalhaes' omzeilen der aarde, stelt het noordelijk deel van de nieuwe wereld nog steeds voor als een geringe uitgestrektheid bezittende en voornamelijk uit grootere of kleinere eilanden bestaande. Schoner's globe van 1523 is daarvan de beste type. Op die der 5de groep wordt Noord-Amerika als een voortzetting van Azië geteekend, bijv. op die van Schoner van 1533; op die van Casper Vopell Medebach, in 1543 te Keulen vervaardigd, in het oudnoordsche museum te Kopenhagen bewaard en waarschijnlijk meermalen door Tycho Brahe gebruikt; voorts op de zoogenoemde globe van Nancy, aldaar insgelijks tegen het midden der zestiende eeuw vervaardigd.

Tot de zesde groep van globes, waarop de landengte van Panama voorkomt, Noord-Amerika zich verder uitstrekt en van Azië gescheiden is door een nauwe straat (van de golf van Californië door de Hudsonbaai naar straat Davis getrokken) behooren de globe, die tegen het jaar 1540 te Neurenberg werd vervaardigd en waarschijnlijk het werk was van een beroemd cosmograaf en globemaker, Georg Hartmann, die in 1489 te Neurenberg geboren werd (dus niet van Schoner, die op zijne globes een geheel andere voorstelling gaf van Azië, Amerika en Australië); voorts de globe van Mercator van 1541, door den bibliothecaris der Kon. Bibliotheek te Brussel teruggevonden, waarop de Oostzee en Scandinavië het eerst volgens de nieuwe kaart van Olaus Magnus beter worden voorgesteld, ook de meren van Rusland beter geteekend en Azië van Amerika wordt gescheiden door een straat, waarin, volgens de teekening van Olaus, een walrus zwemt. Overigens komen op deze globe

de rivieren en omtrekken van Afrika minder juist voor; Madagastar wordt veel te groot geteekend, terwijl Azië zich veel te ver oostelijk uitstrekt. Rondom de Zuidpool is natuurlijk een onmetelijk groot laal neergelegd. —

Hebben wij ons tot dusver bepaald tot de aanwijzing der betere voorstelling van landen en werelddeelen, op de nieuwe kaarten en globs voorkomende, het spreekt van zelf, dat de verbeteringen in de cartographie zich daartoe niet alleen beperkten. Vooreerst werden steeds betere projectis gebezigd, zooals door Nordenskiöld in zijn achtste hoofdstuk uitvoerg wordt aangetoond 1). Doch bovendien werden nu niet enkel meer tabulæ novae bij de edities van Ptolemaeus gevoegd, maar verschenen ook gehed zelfstandige kaarten, op nieuwe onderzoekingen gebaseerd, terwijl vader de kunst om kaarten te vervaardigen en te drukken meer algemen werd beoefend en niet zoo uitsluitend het eigendom bleef van Italiaansche kunstenaars als dit tot dusver het geval was geweest. Reeds in 1475 had men te Lübeck een paar houtsneekaarten het licht doen zien, terwijl in 1482 en 1486 te Ulm en in 1513 te Straatsburg edities van Ptolemaeus verschenen, die soms met 20 in die steden vervaardigde nieuwe kaarten voorzien waren. Toch duurde het nog lang, voordat zich de zetel die industrie voor goed benoorden de Alpen vestigde, al bezigde men dan ook niet zelden in Italië teekenaars en graveurs, die uit het vaderland van Gutenberg afkomstig waren. Zelfs nog, toen tusschen 1513 en 1547 de liefde voor cartographie in Italië scheen te verflauwen, verlevendigte zij zich tusschen 1548 en 1570 zóózeer, dat de meeste nieuwe kaarten, tusschen die jaren verschenen, van Italiaanschen oorsprong zijn. Doch toen in 1570 de eerste editie van Ortelius "Theatrum Orbis terrarum" he licht zag, werden de Nederlanden voor geruimen tijd ook in dat opzicht de zetel der cartographie, dat de uitvoering der kaarten, die er eerst,

¹⁾ Hij onderscheidt daarbij: A. Projections used before the beginning of the 15th estury (1. Paratopical maps, zonder projectie, graden of loxodromen; 2. Seacharts or putolanos; 3. Zone maps; 4. Maps of the projection of Marinus; 5. Maps on a conical projection). B. Projections of maps introduced during the the 15th century (6. Projections of Donis ((Projection trapéziforme: d'Avezac)) 7 homeother projection of Ptolemy). U. Projections introduced during the first half of the 16th century (8. Stobnicza's homeother projection; 9. Cordiform projection of Sylvanus; 10. Cordiform projection of Appenus; 11. Werner's cordiform projections; 12. Oval projection of Bordone; 13. Stereographic projections; 14. Bacon's meridian projection; 15. Da Vinci's projection; 16 et 17. Projections of Glareanus en Florianus). D. Projections first employed between 1559 and 1600 (18. Mercator-Postel's equidistant polar projection; 19. Mercators isogosic cylindrical projection ((Mercators projection))).

toen bedoelde kunst zich van Italië naar Duitschland verplaatste (zooals uit de ruwe houtsneden gemakkelijk te zien is) niet op vooruitging, later weder geheel tot de oude hoogte opklom. De kaarten van Ortelius en Mercator kunnen volkomen met de oude kopergravures te Rome en te Venetie vergeleken worden. Voegt men bij dezen vooruitgang in de uitvoering het zeker niet minder belangrijke feit, dat Duitsche, Hollandsche en Fransche geographen zich steeds meer trachtten los te maken van den door Ptolemaeus uitgeoefenden, boven omschreven invloed, zoodat hun kaarten der oude en nieuwe wereld op nieuwe geographische grondslagen werden opgetrokken, dan laat het zich begrijpen, dat wij een nieuw tijdperk in de geschiedenis der cartographie naderen. Blijkt dit nog slechts uit enkele der kaarten, tusschen 1520 en 1550 samengesteld 1), welke Nordenskiöld in zijn negende hoofdstuk (the End of the

¹⁾ Welke wij daarom ook, met het oog op den omvang van het artikel, slechts even ter sprake zullen brengen. Onder de lange lijst van daar zeer kort besproken kaarten, afzonderlijk of in werken gepubliceerd, verdienen de aandacht behalve eenige later te noemen van Apianus, Gastaldi en Mercator: de kaarten in de edities van Ptolemseus van 1522, 1525, 1535 en 41, waarin een Tabula moderna Indiae orientalis, T. Superioris Indiae et Tartarise majoris, Orbis typus Universalis juxta hydrographorum traditionem exactissima depicta (alle drie door N., resp. p. 99, 101 en op pl. XXXIX gereproduceerd); een plan van de stad Mexico in de brieven van Cortes; de kaart van Robert Thorne in Hakluyt's "Voyages", die vooral voor de nieuwe wereld nieuwe bronnen, waarschijnlijk Spaansche kaarten doet veronderstellen en ook Zuid-Amerika en de landengte van Panama zooveel beter teruggeeft; de menigte van kaarten in het werk van Benedetto Bordone, tegen het jaar 1525 verschenen, met de eerste gedrukte speciale kaart van Europa, een goed geprojecteerde wereldkaart en vele detailkaarten van onderdeelen in Europa en Azië, die weinig waarde bezitten; de kaart in het werk van Simon Grynaeus en Joan Huttichius "Novus Orbis Regionum ac Insularum veteribus incognitarum" etc. in 1532 te Parijs verschenen (dus niet in de editie 1522 te Busel), waarop niet enkel de zee bewesten Str. Magellan «mare Magellanicum" wordt genoemd, maar ook reeds de naam Furna (Tierra) Dariena voorkomt; de kaart in Fetrus Martyr en Oviedo's Historia de l'India occidentali, Vinegia 1533, waarop de West-Ind. eilanden nauwkeuriger voorkomen, ook merkwaardig als een der vroegste Spaansche cartographische werken; eenige kaarten in C. Julius Solinus' Rerum toto orbe memorabilium thesaurus", Basel, waarin een rivierkaart van Rusland, nauwkeuriger dan die van Herberstein en een merkwaardig gedeelte van de kust van Amerika aan den grooten pessan; kaarten in de edities van Ptolemasus van de jaren 1540, 41, 42, 45 en 52, loor Sebastisan Münster bezorgd en in Münsters -Cosmographia", bijv. die van Boheme, waarop de verspreiding der verschillende godsdiensten staat sangewezen (dus de perste statistische kaart); de eerste algemeene kaart van het Amerikaansche continent; en kaart getiteld . Muscoviterlands neue Beschreibung" en met vele andere kaarten rebaseerd op eigen aanschouwing (zie N., tekst p. 110); een planisfeer, door Sebastiaan

early period of geography) de revue laat passeeren, des te duidelijker komt dit uit in zijn laatste hoofdstuk, waarin Jacopo Gastaldi, Apianus, Abrahamus Ortelius en Gerard Mercator afzonderlijk besproken worden. "Ea zeer verklaarde verandering", zoo opent Nordenskiöld zelf dit hoofdstuk. "openbaart zich in het midden der 16de eeuw in de ontwikkeling der cartographie. De geograaf was tot dusver tevreden geweest met algement kaarten, gebaseerd op de geographische gegevens, in Ptolemaeus Cosmographia bijeen gebracht, of ter verklaring en aanvulling van dat wet verzameld, nl. itineraria, afstandsbepalingen en eindelijk eenige astrogeographische waarnemingen, die trouwens meestal onnauwkeurig moesten zijn, daar de lengtebepalingen vóór de uitvinding der chronometes moeilijk, zelfs bij benadering, nauwkeurig konden zijn. De cartographie der nieuwe wereld bepaalde zich nog steeds bijna uitsluitend tot voorstelling der kust en de geographen hechtten aan dat deel der aarde toen bijm even weinig gewicht als thans aan het in kaart brengen van de onbewoonde noord- en zuidpoolgewesten. Vooral bij de oude wereld was he: geloof aan de onfeilbaarheid van Ptolemaeus nog het meest ongeschokt, en het gold voor den cartograaf als de grootste verdienste, wanneer hi de nieuw verzamelde gegevens met de classieke types der 2de eeuw kon in overeenstemming brengen. Eenige chorographische en topographische kaarten, misschien rechtstreeks in 't leven geroepen door het eerste hoofdstuk van Ptolemaeus' geographie, waren reeds gedrukt, en van het midden de 16de eeuw af werden zulke detailkaarten, op eigen opnamen gebaseeri, meer en meer algemeen 1), waardoor natuurlijk ook de algemeene kaaren

Cabot van 1544, in de Bibliothèque nationale te Parijs aanwezig; een kaart in Palw de Medina's "Arte de Navegar", Sevilla 1545, merkwaardig door de juistheid der mekening van de Oostkust van Amerika, doch overigens een bewijs van het lage nivest, waarop in Spanje de cartographische kunst nog in het midden der 10de eeuw was stansk gebleven; en eindelijk de kaarten in Herberstein's werk "Rerum Muscoviticarum commentarii", Weenen 1545, met een kopergravure (de kaart van Rusland), wellicht en der eerste in koper gestoken kaarten, die in Duitschland het licht zagen, een hostkaart van dat rijk, een plan van Moscou enz. Dat deze kaart van Rusland, Polen en het Westen van Siberië insluitende, de eerste was, die eenige meer volledige kesse van Rusland in West-Europa verspreidde, bewijst N. (p. 114 en 115) door opsommit van de vroegere publicaties van dat rijk op cartografisch gebied.

¹⁾ Als voorbeelden van chorographien of van detailkaarten, reeds gedrukt voor be midden der 16de eeuw, kunnen genoemd worden: de kaarten van Lotharingen, Zestserland, Creta, Avignon, (zie N., p. 117); verschillende kaarten in de edities van Pollemaeus, door S. Münster en Gastaldi (Venetië 1548) bezorgd; kaarten van het Heiselland, gebaseerd op bijbelsche overlevering, portolanos en waarnemingen van pelgriss:

zooveel vollediger werden dan in de periode, waartoe de incunabelen der cartographie behooren; maar het breken met de autoriteit der klassieken: "that formed the real source and cause of the modern period, introduced by the works of Gastaldi, Philip Apianus, Ortelius and Mercator". —

Om de verdiensten van Gastaldi te verklaren, moeten wij ons nog even weder naar het tijdperk van herleefden bloei der cartographie in Italië, tusschen de jaren 1548 en 70, verplaatsen. De toen aldaar vervaardigde kaarten hebben Ortelius meermalen tot model gediend; en wanneer velen dezer later onbekend bleven, zeldzaam werden of verloren gingen, dan ligt dat aan de omstandigheid, dat zij op afzonderlijke bladen en niet in een zoo volledig en systematisch gerangschikt werk als Ortelius "Theatrum" of Mercators "Atlas" het licht zagen. Wij komen op die omstandigheid later terug. Gelukkig dat daarop deze uitzondering bestond, dat de belangrijkste dier kaarten, hoewel afsonderlijk in verschillende steden van Italië gedrukt, in één of meer folio-deelen, met een gemeenschappelijken titel voorzien, werden bijeengebracht, Die titel is ook daarom merkwaardig, dewijl op het daarvoor bestemde blad voor het eerst in druk wordt voorgesteld, hoe Atlas de aarde draagt, wat dan voor het vervolg het symbool voor een verzameling kaarten is geworden. Jaar der publicatie of naam van den uitgever worden niet genoemd, maar de fraaie titel der prachtige verzameling kopergravures is waarschijnlijk het werk van Antonio of Antoine Lafreri, een Fransch artist, die, te zamen met zijn oom Duchet, in 1540 een beroemd atelier voor kopergravure te Rome vestigde. Men citeert dezen atlas dan ook gewoonlijk onder de naam van "Lafreri's Atlas" of "den Atlas van Rome". Eenige der kaarten zijn ook werkelijk te Rome vervaardigd, doch het meerendeel, in tegenspraak met den titel: "stampate con studio et diligenza in Roma", te Venetië of elders. Niet onwaarschijnlijk is het, dat Lafreri of een ander uitgever die verschillende kaarten heeft bijeengebracht, om later te Rome een werk uit te geven in den trant van Ortelius "Theatrum", doch tot uitvoering kwam dit plan niet. Er bestaan van Lafreri's Atlas ook slechts twee exemplaren: éen in de boekerij van het Collegio Romano, éen in Nordenskiöld's private verzameling. Van daar dat die Atlas zoo weinig bekend is, in de meeste werken over cartographie niet besproken wordt, tot een der grootste zeldzaamheden der litteratuur behoort en dus terecht door N. nauwkeurig met alle daarin

plans en gezichten van havens, soms geheel verdicht, soms echter ook op eigen waarneming gegrond; Ziegler's "Schondia" van 1532, Olans Magnus' kaart van Scandinavië, van 1839; Herberstein's kaarten in zijn "Moscovia", enz.

voorkomende kaarten wordt omschreven (p. 118—121). Van het eerste exemplaar en van eenige kaarten, die in een tweede en derde deel waren bijeengebracht alsmede van eenige nieuwere edities van vroegere kaarten vindt men eene beschrijving in Carlo Castellani's "Catalogo ragionato", Roma 1876. Te zamen zijn er 142 kaarten, waarvan 121 in Nordenskiold's exemplaar. Van deze 142 zijn 3 vóór 1556, 21 tusschen 1556 en 60, 27 tusschen 1561 en 65, doch de meeste (36) tusschen 1566 en 72 gedrukt. De belangrijkste van deze, uit het oogpunt der techniek war meesterstukken, zijn het werk van Jacopo Gastaldi of Castaldi, zeker een der eerste cartographen of cosmographen, van wien men echter, in weerwil der in 1881 van hem gegeven biographie, weinig meer afwet dan dat hij in Villafranca (Piemont) geboren werd, te Venetië, waar de meeste zijner werken het licht zagen, leefde en bij zijn tijdgenooten den naam van "eccellentissimo cosmografo Piementese" verkregen beeft

Wat Petrus Apianus of Bienewitz betreft (1531-80), reeds in 1552, als opvolger van zijn beroemden vader, tot professor in de mathematiek aan de Universiteit te Ingolstadt benoemd, is hij de vervaardiger de beroemde XXIIII te München in 1566 verschenen "Bairische Tafeln", waarvoor hij tusschen 1554 en 61 de opname en triangulaties verrichtte. Hoewei veel minder schoon uitgevoerd dan de Italiaansche kaarten, kunnen zij, wat de juiste ligging van steden, rivieren, bergen enz. betreft, niet te hoog gesteld worden. Zijn lengte- en breedtebepalingen zijn bijna volkomen juist en veel nauwkeuriger dan die van Gastaldi, wat trouwens van zelf spreekt, als men bedenkt, dat de kaart van Apianus op triangulate steunt en die van Gastaldi (wij bedoelen zijne kaart van Italië) op portolano's en compas-waarnemingen, waarschijnlijk uit de 13de of 14de eeuv. toen de afwijkingen van dit instrument nog onbekend waren. Bij ees vergelijking tusschen de Duitsche en Italiaansche kaart vergoedt dus & degelijkheid van opname en waarneming zeker het gemis aan uitwendige schoonheid of sierlijkheid van uitvoering.

Daar wij Ortelius straks afzonderlijk zullen bespreken, rest ons nog slechts een woord in het midden te brengen over Gerard Mercator, wat na de voortreffelijke publicatie van Dr. van Raemdonck 1), schier overbodig mag geacht worden. Slechts dit zij opgemerkt, dat de studiën van dezer buitengewonen man, die zich oorspronkelijk op wijsbegeerte toelegde, doch zich geruimen tijd, om in de behoeften van zijn gezin te voorzien met het teekenen en graveeren van kaarten en het vervaardigen van

¹⁾ Gerard Mercator, sa vie et ses oeuvres, St. Nicolas 1869; zie ook Breusing, Gehard Kremer, genannt Mercator. Vortrag gehalten zu Duisburg 30 Marz 1869.

astronomische instrumenten bezig hield, later op het gebied der cosmographie gelegen waren. Met welk gevolg, kan blijken uit zijn in 1540 voltooide kaart van Vlaanderen (zijn in 1537 vervaardigde kaart van het Heilige Land ging verloren), zijne globes, de kaart van Groot-Britannië, de beroemde wereldkaart van 1569, de nieuwe editie van Ptolemaeus van 1578, zijn nieuwen systematischen Atlas, waarvan, dewijl Ortelius hem met zijn "Theatrum" vóór geweest was, slechts enkele gedeelten verschenen, en andere. - "Door de betrekkelijke nauwkeurigheid", zoo besluit Nordenskiöld zijne bespreking van Mercator, "en den rijkdom van bijzonderheden, het voortreffelijke in zijn kopergravure, zijn inzicht in de mathematische beginselen der kunst van kaartenteekenen en de gebreken of voordeelen van de verschillende projecties, hebben de meeste zijner kaarten een modern type. Staan zij ook al in topographische nauwkeurigheid bij de "Bairische Landtafeln" achter; komen bij hem principieele dwalingen voor, uit midden-eeuwsche kaarten overgenomen (bijv. het laten stroomen der rivieren in rechte lijn van zee tot zee: een fout, die men op de kaarten van Ptolemaeus uit de tweede eeuw niet zal aantreffen); liet zijn kritiek in scherpte te wenschen over en was hij ongelukkig in het kiezen zijner bronnen bij het in kaart brengen van ver afgelegen landen; oefende ook zijn neiging tot mysticisme soms een ongunstigen invloed op zijn cartografischen arbeid uit - toch moet men een tijdgenoot, ook uitgever van kaarten, volkomen toestemmen, als hij hein "in cosmographia longe primus" betitelt. En als men het genie en de grootheid van een philosoof moet afmeten naar het belang der nieuwe en vruchtdragende denkbeelden, die hij opvatte, of naar de hoeveelheid nuttig werk, door hem in dienst der wetenschap zoo eervol verricht dan staat de meester van Rupelmonde sedert Ptolemaeus onovertroffen in de geschiedenis der cartographie."

Tot zoover Nordenskiöld over Mercator.

Wij zijn hiermede ook aan het einde onzer bespreking van den Facsimile-Atlas gekomen. Was het niet gemakkelijk in beperkte ruimte een overzicht te geven van den zoo rijken inhoud, en het gewicht van alle kaarten in het licht te stellen — dit hopen wij te hebben aangetoond, dat het belang van het werk niet enkel gelegen is in de reproductie van zoo vele en zoo zeldzame kaarten, die men thans op zijn studeerkamer onder het vergrootglas kan brengen en vergelijken, maar evenzeer in den zoo hoog gehouden, streng critischen en wetenschappelijken tekst, een uiterst leerzame bijdrage tot de geschiedenis der cartographie, der ontdekkingsgeschiedenis en der geographie: helder en met liefde geschreven, een juist

licht werpende op de hoofdzaken en de hoofdmomenten in die zoo belangwekkende geschiedenis der verovering door den mensch van de groote aarde, zijne woonplaats 1).

II. EPISTULAE ABRAHAMI ORTELII.

Wij gaan thans over tot de bespreking van het tweede werk, aan 't hoofd van dit artikel genoemd, zoo veel licht werpende over een de hoofdpersonen uit de geschiedenis der nieuwere cartographie, en dat we in verband met zijn tijd en zijn tijdgenooten.

Wij wenschen vooreerst het ontstaan van het werk en de verdiensten de samenstelling nader in het licht te stellen; voorts de bespreking der werkzaamheid van Ortelius daaraan vast te knoopen; de waarde der door en aan hem of aan zijn neef geschreven brieven, uit geographisch oogpunt beschouwd te leeren kennen, en ten slotte, met een en kel woord, de aandacht op de waarde dier brieven ook voor de kennis van zijn tijd en zijn tijdgenooten te vestigen.

Wat het ontstaan en de verdiensten der samenstelling van het werk betreft, daarover werpt de boven zoo uitvoerig aangehaalde titel reeds eeng licht: de in het archief der Dutch Church te London sedert jaren berustende brieven werden, in opdracht van den kerkeraad, welks leden hier eershalve genoemd worden 2), door Johannes Henricus Hessels met niet gewone zorg voor de pers gereed gemaakt en daarna ten getale van slechts 250 ex. op de universiteits-drukkerij te Cambridge gedrukt. Zij zagen in 1887 te London bij C. J. Clay et fil., te Amsterdam bij Frederik Muller et soc. als een ware prachtband, wat de uitvoering betreft, het licht. De statige kwartijn van 966 pp. werd door het Consistorium aan HH. MM. de Koningen van Nederland en België opgedragen.

Doch, wat men niet op den titel kan lezen, is dit, dat deze brieven, vroeger naar de voornamen, later naar de achternamen der schrijvers alphabetisch gerangschikt, door Hessels in chronologische volgorde werdes uitgegeven, waarbij het hem gelukte van de 34 brieven, die in des catalogus der boekerij van de Dutch Church, in 1879 gepubliceerd, nog

¹⁾ Prof. von Wieser noemt zijn werk: .ein Quellenwerk ersten Ranges, ein Werk van monumentaler Bedeutung".

²⁾ Minister, seniores et diaconi ecclesiae Londino-Batavae 1887. Abrahamus Didericus Adama van Scheltema, verbi Dei Minister; Adrianus Pompe, Senior et Thesarius; Hermannus Koekkoek, Senior; Franciscus W. C. Vogel, Diaconus; Joannes T. C. van Dulken, Diaconus.

zonder datum stonden opgegeven, aan 29 een bepaald jaar en datum aan te wijzen 1) en vele verkeerd gespelde namen te verbeteren; dat het overschrijven der brieven, oorspronkelijk door een ander begonnen, na 't overlijden van dezen en wegens de geringe zorg, daaraan besteed, insgelijks door Hessels moest worden ter hand genomen; dat zich daarbij, wat het ontcijferen van het schrift en de spelling der namen betrof, voor iemand, die "had no experience, or at least very little of the handwritings and the literary development of 16th century", inderdaad zeer groote moeilijkheden voordeden; dat de brieven bijna zonder uitzondering worden voorafgegaan door "summaries" of min of meer vrije vertalingen van den inhoud, waardoor zij in Engeland zooveel gemakkelijker konden verstaan worden, doch die tevens voor alle lezers een zeer groot gemak opleveren; en, last not least, dat aan de nauwkeurigheid der uitgave zeer groote zorg is besteed, zoodat gemakkelijk geloofd kan worden, wat de heer Hessels in de Preface verzekert: "several eyes have passed over my editorial work and my own more than four times". - Voegt men bij dit alles een biographie van Ortelius en zijn neef; een aan wijlen onzen voortreffelijken Tiele ontleende, hier en daar eenigszins verbeterde en aangevulde opgave der edities van het "Theatrum"; een zeer belangrijke tabel der kaarten, zooals zij in de edities vóór 1573 en van 1573-95 (drie jaren vóór Ortelius' dood) in de verschillende "Additamenta" voorkomen; een opgave zijner andere werken; verklarende en biographische noten aan den voet en achter de brieven; den hieronder genoemden, met zooveel zorg bewerkten Index, bij een zoo groot aantal brieven van niet geringe beteekenis; de het werk besluitende handschriften van Erasmus, Albr. Durer, Marnix van St. Aldegonde, Justus Lepsius en Abraham Ortelius; het portrait van den laatsten en drie kaarten, bij brief 217 gevoegd, - dan moge het den lezer duidelijk geworden zijn, dat deze publicatie een waardige tegenhanger vormt met die over Chr. Plantin, door Max Rooses in 1883 te Antwerpen uitgegeven; over Beatus Rhenanus, door A. Horawitz en Dr. K. Hartfelder bezorgd (Leipzig 1886) en over A. Masius, welke Dr. Max Lossen, insgelijks in 1886, te Leipzig het licht deed zien.

Dat deze brieven van en aan Abraham Ortelius, reeds in 1887 verschenen, hier te lande slechts kort (in den Spectator van 1888, p. 231,

²⁾ Zie de Chronological List of the (371) Letters, dienstdoende als "Table of Contents" (Preface, p. LXV—LXXV), waar ook de 5 ongedateerde brieven staan opgegeven, terwijl achteraan het werk, in den "Index", de alphabetische volgorde wordt in acht genomen.

door den heer Tiele) werden aangekondigd, moge dan ook zijne verklaring vinden in het klein aantal gedrukte exemplaren en de zeker geringe verspreiding daarvan in het kleine Nederland. Niet zoodra had onze geachte ambtgenoot, de Heer J. J. van Toorenenbergen, nog nader onze aandacht op deze uitgave gevestigd, waarvoor wij hem bij dezen openlijk dank betuigen, of wij hebben ons gehaast de brieven in het daarvoor aangewezen tijdschrift andermaal en uitvoeriger ter sprake te brengen.

Tot zoover vooreerst het werk in het algemeen.

Gaan wij thans, vóórdat wij de waarde der brieven meer in 't bijzonder bespreken, tot den persoon van Ortelius over, dan zij terstond opgemerkt, dat het niet in ons plan kan liggen, de van dezen door Sweerts in de editie van het Theatrum van 1603 gegeven levensbeschrijving (door den samensteller van het zoo uitvoerige artikel over Ortelius in Ersch und Grüber op den voet gevolgd) of de door Génard (Bull. de la Soc. de géogr. d'Anvers 1881), Felix van Hulst (2de ed., Luik 1846), Staes 1), Hessels en Nordenskiöld geleverde biographien, met nog eene te vermeerderen. Wij zullen dan ook liever, nadat wij den lezer de voornaamste bijzonderheden uit het leven van Ortelius in herinnering hebben gebracht, over de plaats, die hem onder de cosmographen of geographen van zijn tijd toekomt, in verband met het oordeel, door Nordenskiöld over hem uitgesproken, een en ander in het midden brengen.

Abraham Ortel of Ortels (lat. Ortelius) werd den 4den April 1527 te Antwerpen geboren, waar, volgens de grondige onderzoekingen van Génard, niet alleen zijn vader, doch hoogst waarschijnlijk ook zijn grootvader te huis behoorden, terwijl een enkel lid van die familie Ortels, welke te Duisburg en te Augsburg verblijf hield, slechts voor korten tijd in Antwerpen vertoefde en daarom ook niet verder in de archieven dier stad kon worden nagespoord ²).

Op twintigjarigen leeftijd liet Abraham Ortelius, de zoon van Leonard en Anne Herwayers, zich inschrijven als "afsetter van kaerten" in het gilde van St. Lucas. Uit het zoo belangrijke artikel van Max Rooses "Ortelius et Plantin" blijkt duidelijk, dat hij zich, althans sedert het jaar 1558, daarbij niet tot het "afsetten van kaerten" bepaalde, maar ook handel dreef in boeken. Tot driemalen toe, in 1558, 1564 en 1567, staat in de journalen en registers van het plantijnsche archief geboekt. dat en welke boeken Ortelius zich aanschafte.

¹⁾ Antwerpeche reizigers van de vroegste tijden tot op heden, ens. Zeer onbelangrijk.

²⁾ Zie ook brief 355, die volkomen Génards gevoelen bevestigt.

Wat overigens dien aankoop en voorts het kleuren, opplakken en verkoopen der kaarten betreft, 't welk alles onder dat "afsetten" moet verstaan worden, wij staan er niet enkel bij stil, omdat daaruit blijkt, wat in de brieven van Johannes Radermacher aan Jacobus Cool openlijk wordt erkend, dat hij dit beroep ter hand moest nemen, ten einde in de behoeften van zijne moeder en zusters te voorzien, maar vooral, omdat het juist dit beroep was, dat hem terstond met zoovele mannen van wetenschap in aanraking bracht, hem tot het doen van verschillende reizen, o. a. naar Italië, Frankfort, Parijs noopte, en aanleiding gaf tot het samenstellen van den Atlas of "het Kaertboek", waarover terstond meer 1).

Een belangrijk jaar in het leven van Ortelius is zeker het jaar 1567, toen hij met Plantijn in een door Hendrik Niclaes gesticht geheim genootschap trad (het Huys of Huysgesin der Liefde), waarin de aanhangers van verschillende geloofsbelijdenissen werden opgenomen en dat door Alva terstond bij zijn komst werd opgeheven. Blijkt daaruit dat tusschen beide mannen reeds toen overeenstemming van denkbeelden op godsdienstig gebied bestond, hunne betrekkingen werden vooral sedert het jaar 1570 menigvuldiger en inniger. Toen toch verscheen het "Theatrum", dat wel bij Egidius van Diest op kosten van Ortelius gedrukt werd, maar waarvoor Plantijn het papier leverde, terwijl hij tevens, zooals Max Rooses weder heeft aangetoond 2), jaren achtereen een zeer groot aantal exemplaren van dit werk aan den man bracht. Ook om in het licht te stellen, hoe gewild het Theatrum mocht heeten, deelen wij mede, dat Plantijn er in 1570 149, in 1572 118, in 1573 106, in 1579, toen de edities zooveel vermeerderd en duurder waren geworden, nog weder 146 exemplaren van bestelde, en ook later telkens zoovele, dat Rooses het geheele aantal, 't welk tijdens het leven van Ortelius alleen door Plantijn en Moretus geplaatst werd, over 28 jaar op 1742 exemplaren, of meer dan 62 per jaar, kan stellen. Hiermede stemt volkomen overeen, wat Génard mededeelt, dat nl. de verkoop wel wonderbaarlijk groot moet geweest zijn, want dat reeds eenige maanden na het verschijnen een tweede editie bij denzelfden drukker het licht zag, in 1571 een derde, tegelijk

¹⁾ Dat hij in dit tijdperk van zijn leven ook reeds eenige op zich zelf staande kaarten het licht deed zien, blijkt uit zijne brieven, o.a. in 1561; de Typus Orbis Terrarum, de eerste kaart in zijn Theatrum (zie brief 11 en 15); voorts die van Egypte, de 52ste in het Theatrum; die van Azië (brief N°. 19); de Arx Brittannica (N°. 24). Onzeker is dit van de kaart van "Dionen" (Dyon), Rome en "nieu Vranckryk", waarvan sprake is in brief 330.

²⁾ Buil. de la Soc. de géogr. d'Anvers 1880, p. 350.

met een Vlaamsche vertaling, en in 1572 een Duitsche. Later (1579) werd de Atlas ook bij Plantijn gedrukt, eerst nog op kosten van Ortslius, sedert 1588 van Plantijn zelven.

Het zal hier de plaats zijn om over het ontstaan van dit "Kaertboek" eenige bijzonderheden mede te deelen. Wij ontleenen deze aan de te diez opzichte zoo merkwaardige brieven 330, 331 en 334, waarin de reeds boven genoemde Radermacher op de vraag van Jakob Cool, hoe Ortelius tot de samenstelling van dien Atlas gekomen was, het volgende mededeelt. Om dit goed in het licht te stellen moet hij eerst vertellen, hoe de vriendschap tusschen hem, Radermacher, en Ortelius ontstaan is. In 1554 was hij in de leer gekomen bij Aegidius Hooftman, een welbekend koopman te Antwerpen, waar hij den niet minder bekenden Emanuel van Meeteren, een bloedverwant van Ortelius, ontmoette. Door hun gemeenschappelijke liefde voor geschiedenis werden beide jonge mannen spoedig vrienden en werd in hunne gesprekken meermalen de naam Ortelius genoemd, die [om vroeger genoemde reden] zich met den verkoop van kaarten en boeken bezighield, maar zich niet minder dan zij tot de studie der geschiedenis aangetrokken gevoelde. Daar Ortelius dikwijls op res moest, had R. eerst geen gelegenheid hem te ontmoeten, totdat Ortelius belast werd met den verkoop der boekerij von John Rogers (den vader van Daniel Rogers, ambassadeur van koningin Elizabeth aan het hof van keizer Maximiliaan II). In die bibliotheek waren eenige zeldzame theologische werken, welke Radermacher van Ortelius ter bezichtiging vroeg, die hij later kocht en nog steeds bewaarde "tanquam testimonia initæ dulcissimae illius amicitiae." - Nadat R. daarop uitvoerig over die langdurige vriendschap heeft uitgeweid, keert hij tot zijn patroon Hooftman terug, waarop het voor ons in dezen meer aankomt. Die patroon, ofschoos zelf geen geletterd man, had groote achting voor kunst en wetenschap vooral voor die, "quibus conatus suos juvari sentiret"; en daar hij zeer rijk was, kon hij zich en anderen den aankoop van velerlei boeken veroorloven. Hij overtrof weldra alle Antwerpsche kooplieden in fortuin, "virtutes mercatoriae" en "peritia rerum nauticarum." Voor zijn nautische waarnemingen verlangde hij vooreerst alle noodige instrumenten te bezitten, doch verder ook zeekaarten en compassen, die hij vooral gebruikte om berekeningen te maken ten opzichte der veranderingen van de winden, waardoor hij dikwijls in de gelegenheid was om de gevaren van schipbreuken en afwijkingen van den koers vooruit te zien en zoo voordeelen in het verzekeren te verkrijgen. Voorts schafte hij zich alle gegraphische kaarten aan om afstanden te kunnen bepalen, de vrachten en

de gevaren, waaraan zij bij het vervoer blootstonden, te kunnen berekenen en tevens de berichten aangaande de Europeesche oorlogen te kunnen nagaan. Maar daar het uitrollen van de groote kaarten dier dagen zeer lastig was, gaf Radermacher hem den raad om zooveel mogelijk kleine taarten in een boek te samen te binden, dat dan gemakkelijker te hanteeren zou zijn. Hooftman ging op dien raad in en R. droeg O. op uit Italië en Frankrijk zoovele kaarten te ontbieden als maar gevonden konden worden "unico papiri folio impressae." Zoo ontstond een deel van ongeveer 30 kaarten, geruimen tijd in het bezit van Hooftmans erfgenamen 1), 't welk zoo praktisch in het gebruik bleek te zijn, dat Ortelius besloot het nut daarvan binnen het bereik te stellen van beoefenaars der reographie in 't algemeen en de grootere kaarten der beste samenstellers, meestal ongelijk van omvang, op dezelfde grootte gebracht, in een deel samen te vatten ("ita ut probatissimorum authorum tabulas geographicas, grandiores raroque forma sibi similes, in folii chartacei amplitudinem aequalem contractas, uno volumine representaret"). Over de projectie der kaarten en de reductie der grootere ging Ortelius met Radermacher en meer andere vrienden, o. a. ook met Gerard Mercator, te rade 2).

Tot zoover Rademachers bericht over de wording van het Theatrum.

Blijkt daaruit, hoe het denkbeeld om een kaartboek uit te geven ontstond en tot uitvoering kwam, door de genoemde brieven worden wij tevens in kennis gebracht met personen, die op Ortelius geografische vorming van grooten invloed moeten geweest zijn, terwijl de merkwaardige koopman Hooftman met zijne studiën der winden en zijn praktisch wetenschappelijke beoefening der geographie, reeds op zich zelf genomen, alleszins onze aandacht verdient. —

Na het jaar 1570 knoopen zich de gewichtigste gebeurtenissen in het leven van Abraham Ortelius (tenzij men daartoe rekenen wil zijne benoeming tot geograaf des Konings, hem in 1573 door Philips II geschonken

²⁾ Uit brief 330 kan opgemaakt worden, dat hij ze op nieuw teekende en kleurde (een werkzaamheid, waarbij zijne moeder en zusters hem terzijde stonden) en dat hij ze eerst daarna ter pers bezorgde.



¹⁾ In brief 334 schrijft Radermacher, dat hij het kaartboek van Hooftman, dat Ortelius tot model had gediend, in handen had gekregen. Het bevatte 38 kaarten, meerendeels gedrukt te Rome bij Michael Tramezini, doch waarvan 8 of 9 in België verschenen. Hij had nu geen tijd om voor Cool de titels af te schrijven, doch hij zou hem de kaarten zenden, als hij het verlangde. Het zag er vergaan en verscheurd uit, als gevolg van het menigvuldig gebruik. Behalve de kaarten van Azië, Afrika, Tartarijë en Egypte stelden deze alleen landen van Europa voor.

en door Alva overhandigd), bijna uitsluitend aan de publicatie zijner werken en het doen van nog enkele reizen vast. In dat zelfde jaar 1573 verscheen zijn "Deorum Dearumque capita e veteribus numismatibus", een werk, dat in 1602 door Fr. Sweertius en in 1697 door Gronovis in zijn "Thesaurus graecarum antiquitatum" op nieuw werd uitgegeven en zoo duidelijk bewijst, hoe Ortelius reeds toen voor geschiedenis en oudheidkunde, meer bepaald de kennis der oude munten, een ernstige be langstelling koesterde, die hem zijn geheele leven bijbleef en uit een zoo groot aantal zijner brieven spreekt. De door hem bijeengebrachte verzamelingen worden niet enkel door zijne tijdgenooten, ook door kennes van lateren tijd geroemd.

In 1575 bezocht Ortelius Brabant, het land van Luik, Trier, Tongren, Mainz en Valenciennes, waar hij steeds nieuwe betrekkingen aanknoopte; in 1577 Engeland en Ierland, in gezelschap van zijn neef Emanuel van Meeteren; in 1578 bezocht hij voor de derde en laatste maal Italië.

Na het jaar 1578 schijnt Ortelius zich meer uitsluitend met zijne publicties bezig gehouden te hebben, natuurlijk niet het minst met de verschilende edities van zijn Theatrum en de daarbij behoorende Additamenta. Van de eerste verschenen niet minder dan 28 uitgaven, in 5 talen: het Latijn, Vlaamsch, Spaansch, Duitsch en Fransch, niet meegerekend de kleinere edities van zijn Theatrum met gereduceerde kaarten, trouwens niet door Ortelius zelven uitgegeven. Verder deed hij nog in datzelfde jaar 1578 zijn "Synonymia Geographica, sive populorum, regionum, insularum, urbium appellationes et nomina" het licht zien, een betere bewerking van zijn reeds achter het Theatrum van 1570 voorkomende "Synonymia locorum", in 1587 en 1597 andermaal bij Plantijn uitgegeven, doch toen onder den titel "The saurus Geographicus. Hoeveel moeite hem de samenstelling van dit werk gekost heeft, kan blijken uit het bericht van Génard, als deze de copie van dit werk voor het archief van Antwerpen heeft weten machtig te worden Zij droeg het jaartal 1581, en was dus reeds 6 jaar voor de publicatie gereed. Het gedrukte werk bevat dan ook veel meer namen, die tijdens het drukken, dus bij de correctie der proeven, moeten toegevoegd zijs

In 1584 werd, in plaats van de vroegere Synonymia locorum een "Inder Ptolematcus" achter het Theatrum gevoegd, op zijne beurt in 1603, dus na den dood van Ortelius, ook weder afzonderlijk verschenen, terwijl in dat zelfde jaar het verhaal van zijn door België en Frankrijk gemaakte reis het licht zag, onder den titel: "Itinerarium per nonnulls Galliae Belgicae partes", aan Gerard Mercator opgedragen. Blijkt uit het vervangen van de Synonymia door den Index, dat Ortelius van de oude

rugkomen, nog duidelijker wordt ons dit, wanneer wij er op letten, it van nu af (zie Tiele, Bibl. Advers. 1876, III, p. 83) ook de kaarten ir oude wereld, als "Parergon, sive veteris geographiae aliquot tabulae", zonderlijk onder een titel worden vereenigd en een eigene plaats in het beatrum van 1581, 1591 en 1595 innemen.

Niet het minst blijkt Ortelius voorliefde voor de klassieke geographie t zijn laatste werken: zijn uitgave van Julius Caesar met de "Imperii omani Galliarumque et Hispaniarum veterum tabulae e conatibus geoaphicis Ab. Ortelii", in 1593 te Leiden verschenen, en de uitgave van Peutinger-kaart, die hij slechts heeft kunnen voorbereiden, niet voloien. De copie dier kaart werd hem door den bekenden handelaar Marcus elser of Velser, die jaren lang een handelskantoor te Antwerpen had, r hand gesteld. Ortelius haastte zich die te laten graveeren en drukken de Plantijnsche drukkerij, die toen bestuurd werd door zijn vriend loretus. Hoewel de kaart later verscheidene malen herdrukt werd, veraart Ernest Desjardins, de grondige kenner dier edities, dat de Antwerpsche kwijls nauwkeuriger is dan vele uitgaven, die later het licht zagen.

Wij besluiten de bespreking van Ortelius werken met de vermelding in het in 1596 verschenen "Aurei seculi imago, sive Germanorum veterum ta, mores, ritus et religio iconibus delineata et commentariis ex utriusque nquae auctoribus descripta", waarin hij zich nogmaals op archaeologischistorisch gebied bewoog, en dat dus hier niet verder kan besproken worden¹). Nog slechts dit zij over zijne werken in 't algemeen opgemerkt, dat ij daaraan en aan de daarvoor noodige verzamelingen niet enkel zijne este krachten, maar ook een groot deel van zijn fortuin schijnt gewijd : hebben. Het is deze omstandigheid, die wij later, bij het bespreken van rtelius verdiensten, nog weder in herinnering zullen moeten brengen en ie waarschijnlijk niet zonder invloed bleef op het besluit van den maistraat te Antwerpen, toen deze hem drie jaren vóór zijn dood, na 't aanieden zijner editie van het Theatrum van 1595, met de hoogste beoning vereerde, die, volgens Génard (p. 336), in die dagen als "marue d'estime au mérite et au talent" verleend en 15 jaar later ook aan lubens geschonken werd.

Nadat wij nog even hebben opgemerkt, dat ter eere van Ortelius een ledaille werd geslagen en dat de aartshertogen Ernst en Albert hem in

¹⁾ Volgens Felix van Hulst zou hij nog in het jaar van zijn dood een kaart van alaestina onder den titel «Geographia Sacra" hebben uitgegeven.

1594 en 95 met hun bezoek vereerden, op nieuw bewijzen van de hooge achting, welke Ortelius van alle zijden reeds bij zijn leven genoot, besluten wij zijn biographie met er op te wijzen, dat, toen hij in Juni 1598 ta grave was gedaald, zijn dood door zoovele en uitstekende mannen wed betreurd, dat ook daaruit weder blijkt, hoezeer zijn heengaan als en groot verlies voor de wetenschap werd beschouwd. Zijn lijk werd orspronkelijk bijgezet in de abdij van St. Michel, tegenover het huis "de Roode Leeuw", waar hij waarschijnlijk het langst met zijn zuster Anu heeft gewoond. In die abdij hebben deze en zijne neven een grafsten en monument voor hem laten plaatsen, welk momument in 1798 wewoest werd. De grafsteen werd in 1803 naar de oude Kathedraal orgebracht, waar Felix van Hulst ten onrechte meende dat Ortelius begraven lag, en waar de leden van het geographisch congres te Antwepen hem den 18 Augustus 1871 hun hulde gebracht hebben. —

Wezen wij zoo bij herhaling op die hulde, hem door tijdgenoot en w geslacht gebracht, dan geschiedde dit niet zonder reden. Het heeft ons tod getroffen, dat Nordenskiöld in zijne bespreking van den Antwerpscha geograaf die verdiensten zooveel minder hoog schijnt te stellen. "Mot of the maps", zegt hij, "in the Parergon were according to the title it nettes constructed by Ortelius himself, where as the modern maps is the Theatrum are almost always copies of the works of other cartogaphers, whose names are given. Ortelius was thus an enterprising dealers maps, a zealous collector and an intelligent publisher, but with the & ception of the above named map of the world and of a few other work, he was neather an author of modern maps nor a map-draughtsman a map-engraver. He never seems to have executed any topographical # vey, nor did he contribute to the development of science by the imp duction of any new projections or by setting his own hands to the o graving of maps.-" Hij stelt daarna telkens weder in het licht, dat # indefatigable collector" zijn naam en invloed te danken had aan z systematisch, trouwens met "great discernment and skill" verzament van alle mogelijke bestaande kaarten "by which Ptolemy's classical was definitively supplanted in modern litterature"; dat hij daardoor men kaart, die anders verloren zou gegaan zijn, heeft gered; dat hij, da ieder kaart onder den naam des samenstellers te publiceeren en door # "Catalogus auctorum" 1) die de eerste editie voorafgaat, een prachtige

¹⁾ De volledige titel is: Catalogus Auctorum tabularum geographicarum, quipes ad nostram cognitionem hactenus pervenere; quibus addidimus, ubi locorum, quipes a quibus excusi sunt.

lrage tot de geschiedenis der geographie levert (welke N. daarom ook n zijn geheel overneemt, aanvult en verbetert), maar ook weder dezen of laat hij vergezeld gaan van de opmerking, dat wij dit geschenk verchuldigd zijn "precisely to that want of originality, for which he from nother point of view has been justly censured."

Het komt ons voor, dat deze beoordeeling en de plaats, daardoor aan Drtelius onder de geographen van zijnen tijd aangewezen, niet alleen de chting, hem zoo algemeen toegedragen, niet kan verklaren, maar dat laardoor ook in vele opzichten aan zijne verdiensten te kort wordt gedaan.

Vooreerst zij opgemerkt, dat Nordenskiold, hoewel de verdienste, in lit verzamelen gelegen, erkennende, toch niet genoeg licht werpt op de noeiten en werkzaamheden, daaraan verbonden. Daarvoor heeft Ortelius niet enkel gereisd, maar er letterlijk zijn geheele leven door de uitgereidste correspondentie over gevoerd. Uit die brieven blijkt verder dat hij le verkregen kaarten zooveel mogelijk trachtte te verbeteren, de oude en nieuwere namen onderling vergeleek, voor die kaarten en de daarbij gevoegde beschrijvingen tal van bronnen moest raadplegen, welke hij telkens opgeeft, en dat hij zich gaarne de in een en ander ingeslopen fouten iet aanwijzen. Het is dan ook geen wonder, dat de beroemde Mercator, loor Nordenskiöld zooveel hooger gesteld, zich met hetzelfde werk bezig nield, met den meesten lof over den arbeid van Ortelius spreekt en met le publicatie van zijne kaartenverzameling wachtte, totdat het Theatrum eeds verscheidene oplagen beleefd had.

In de tweede plaats wenschen wij te doen opmerken, dat Ortelius och meer was dan ijverig verzamelaar, handig verkooper of hoogtaand uitgever. Blijkt dit reeds uit de vroeger besproken werken, voltrekt niet alle ter toelichting van zijn Atlas uitgegeven, bij herhaling rinden wij ook bij al zijne levensbeschrijvers de uitdrukkelijke verzekeing, dat hij zich van jongs af aan op de studie der klassieken, de geschiedenis, de oudheidkunde en de kennis der munten en inscripies van de ouden toelegde, niet enkel om daardoor zijne geographiiche studies te hulp te komen, ook, zooals zijne verzamelingen aanwijæn, uit liefde voor deze wetenschappen zelve, terwijl hij daarbij de natuurwetenschappen, voor zooverre deze in zijn tijd beoefend werden, niet geheel ter zijde liet liggen. Ontbrak het hem aan oorspronkelijkheid om een eigen projectie uit te denken en in te voeren, wat wel met zijn mathematische opleiding in verband zal gestaan hebben; deed hij zelf geene opnamen, wat hij zeker met velen zijner tijdgenooten gemeen had; of graveerde hij zelf geene kaarten - het schijnt ons toch niet billijk, alleen om die reden, bij iemand, die onder zijn tijdgenooten voor zeer veelzijdig doorging en dit ook was, het gemis aan oorspronkelijkheid zoozeer op den voorgrond te stellen.

In verband met het zoo juist opgemerkte komt het ons verder ook niet wenschelijk voor, bij voorkeur de hoofdverdienste bij Ortelius daam te zoeken, dat hij het eerst een kaart-boek of Atlas samenstelde. Immers wij hebben boven reeds kunnen aantoonen, dat hij niet het eerst op dit denkbeeld kwam en dat reeds anderen vóór hem met de uitvoering daarvas bezig waren. Veeleer zouden wij ons Ortelius willen voorstellen als uitstekend beoefenaar der oude of klassieke geographie, die, zelf historisch gevormd en met beoefenaars der klassieke studien in omgang en correspondentie, zijn hoofdstudie op Ptolemaeus en zijn kaarten concentreerde en vervolgens door zijn Kaertboek dezen geograaf "definitively supplanted in modern litterature." Dit leverde voor zijne tijdgenooten een groot voor deel op. Het was toch in Ortelius' dagen nog alleszins wenschelijk (wat later minder het geval werd), zich aan dien ouden geograaf te houden. In de Midden-Eeuwen had zich het niet raadplegen van zijn werk door snellen achteruitgang van geographie en cartographie gewroken; en bij det aanvang der nieuwe geschiedenis had dat werk, hoewel betrekkelijk eerst kor geleden weder in eere hersteld, toch reeds te grooten invloed op de voorstellingen van hen, die kaarten raadpleegden, verkregen, om het niet liever grondig te bestudeeren, aan te vullen en te verklaren, zooals dit in den Thesaurus geschiedde, dan het ontijdig ter zij te stellen. Bovendien hadden zich, zooals wij herhaaldelijk zagen, de edities van Ptokmaeus in Ortelius' dagen als 't ware gemoderniseerd, zoodat hij, die zich met de studie van diens kaartwerk bezighield, toch ook kennis nemen moest van de tabulae novae en daarmede van den nieuwen toestand der landen en de pas gemaakte ontdekkingsreizen.

Dat dit ook werkelijk met Ortelius het geval was, valt niet moeilijk te bewijzen. Het moge waar zijn, wat Nordenskiold beweert, dat het resultaat van vele der nieuwere reizen op zijn kaarten minder goed wordt teruggegeven dan op die van eenige zijner tijdgenooten: een feit, dat in zijn meer overwegende studie der klassieke geographie op het laast van zijn leven allicht zijne verklaring vindt — van den anderen kant is het even waar, dat Ortelius in een stad als Antwerpen, in de omgeving van een Hooftman en Radermacher, onmogelijk buiten de werking die ontdekkingen kon blijven, welke vooral in de 16de eeuw hun invloed in Noord-Europa deden gelden, en dit des te minder, daar hij dog zijn herhaalde reizen naar Italië, Frankrijk en Engeland en met die lan

den, èn met de daar verkregen kennis der nieuw ontdekte wereld kennis maakte.

Blijkt dit reeds voor een deel uit het groot aantal nieuwe kaarten, in zijn "Theatrum" en de "Additamenta" opgenomen, uit zijn reisbeschrijving der bezochte landen en der niet bij Ptolemaeus voorkomende gedeelten van Europa, het treedt herhaaldelijk op den voorgrond in zijne of de aan hem gerichte Epistulae, waartoe wij ten slotte terugkeeren, om zoowel het laatstgenoemde feit als onze vroegere beweringen te staven.

Wat ons in de eerste plaats in deze brieven treft, is de doorloopende correspondentie over kaarten: in het begin over de toezending van meer zeldzame exemplaren, zooals Ortelius o. a. ook aan Mercator deed toekomen; later voortdurend over correcties, welke Ortelius van hen, die in het vreemde land verblijf hielden, verlangt; voorts over fouten, waarop men hem wijst en waarop hij, zooals uit latere brieven blijkt, gaarne gewezen wordt 1).

Om dit door eenige voorbeelden te bewijzen. In brief 24 verklaart zijn miend Radermacher zich bereid om hem met een zekeren Cornelius, die en kaart van Engeland in twee bladen bewerkte, in verbinding te brengen; in brief 27 belooft Humfredus hem de toezending van zijn kaart van Wales, een kaart van Engeland met oude en nieuwe namen alsmede en beschrijving van Groot-Brittannie. Niet zoodra heeft hij vernomen, lat Daniel Rogerius Groot-Brittannië, meer bepaald Ierland, zal bereizen, of hij heeft zich tot dezen gewend (zie Rogerius' brief van 20 Oct. 1572 1º. 42) om inzage van diens aanteekeningen, welke deze hem toezegt. Als Joannes Neodicus (brief 35) plannen vormt om naar Moravië te gaan, intvangt hij te Keulen nog een brief van Ortelius met verzoek om in le beschrijving van Moravië in het ten geschenke gezonden exemplaar an het Theatrum de noodige verbeteringen aan te brengen en er op te etten, wat hem (Ortelius) daarbij mocht ontgaan zijn. In brief 43 en 44 s hij met Nicolaus Reinoldus en Johannes Sambucus in correspondentie ver kaarten van Muscovië en Polen, van welke laatste kaart de veraardiger zeer hoog op gaf, doch die, zooals uit een later schrijven van Jicolaus Secovius (brief 91) aan Ortelius kan blijken, dezen toch niet in taat gesteld heeft een correcte kaart van dat land te leveren. Ook Hiobus sadeburgus, rector van de school aldaar, aan wien Ortelius insgelijks een

¹⁾ Zie b.v. zijne brieven aan zijn neef Jacob Colins (196 § 8 en 198 § 13), waar hij thrijft: "Nihil mihi gratius quam quod errores a nobis commissos ostenderis" en -Quae 1 Thesaurum nostrum notasti videbo lubens aliquando; scio eum scatere mendis quem m sexcentis in locis aut emendatum aut auctum habeo".

exemplaar van zijn Theatrum had toegezonden, wijst hem op de fouten, in de kaarten van Saksen, Thuringen en Meissen ontstaan (brief 46).

Met de kaart van Spanje 1) schijnt hij gelukkiger geweest te zijn: althans Jeronimus Schollier, die in Spanje reisde, schrijft hem d.d. 6 Nov. 1576 uit Madrid (brief 63): "V. L. Caerten syn ons ouer al seer wel te passe ghecomen, soo dat seer neerstelycken van stede tot stede daer op ghelet hebben, ende de faulte daervan heeft seer weynich te bedieden anders souden de selue gheannoteert hebben, maer daer aen gheen reformatie van doene was".

Uit de brieven 97 en 107 blijkt, dat Ortelius voor een toegezonden exemplaar van zijn Theatrum aan Petrus Edling een gedetailleerde kaart van Stettin en de eilanden Rügen, Usedom en Wollin terug ontving, een feit, dat, in verband gebracht met zoovele andere brieven van hartelijkt dankzegging voor ontvangen exemplaren, licht werpt over het groot aantal, dat door Plantijn verkocht werd, doch niet minder over Ortelius vrijgevigheid daarmede, wanneer het gold zijne kaarten te doen verbeteren aanvullen. Dat hij met zijn Thesaurus geographicus hetzelfde schijnt gedaan te hebben, mag opgemaakt worden uit vele dergelijke brieven, o. 1 uit dien van 13 Nov. 1597 (311), waarin David Hoeschelius te Augsburg in dank voor het toegezonden exemplaar, hem op eenige onjuistheden, daarin voorkomende, meent te moeten wijzen. Reeds acht dagen daama, zooals uit brief 312 van 21 Nov. 1597, dus kort voor Ortelius dood geschreven, kan blijken, heeft deze hem daarvoor dank gezegd, "tarquam pro beneficio praestito".

Blijkt uit deze voorbeelden, die met tal van andere vermeerderd kunner worden, vooreerst, welke moeiten en kosten Ortelius zich getroostte oz zijn Theatrum op de hoogte van zijn tijd te brengen, het is dan ook alleszins te begrijpen, dat een bevoegd beoordeelaar als Mercator ezulk een gunstig oordeel over uitspreekt: niet enkel, wat betreft de zivoering der kaarten, maar ook de kritiek, bij het bijeenbrengen en besamenstellen der beschrijvingen uitgeoefend (brief 32). Ook uit een beschrijven (brief 38) blijkt weder, hoe ijverig Ortelius het nieuwste en bescop geographisch en cartographisch gebied wist bijeen te brengen et daarmede zijn vriend te hulp kwam, zooals deze hem ook zijnerzijd belangrijke diensten bewees.

Wij bedoelen hier de nieuwe kaart van Spanje. In die van Oud-Spanje en Patugal schijnen meer fouten ingeslopen te zijn (Vgl. de brieven van Emanuel Berbus aan Ortelius, n°. 240, 51 en 58).

Stonden beide vrienden blijkens hunne correspondentie te dien opzichte op ééne lijn, ook over hun gemeenschappelijk streven om de na Ptolenaeus ontdekte gedeelten van den aardbol naar vermogen nauwkeurig in taart te brengen, werpen de door ons besproken brieven veel nieuw licht 1). Behoeft dit voor Mercator niet nader aangetoond te worden, voor Ortelius schijnt dit na Nordenskiölds opmerking niet overbodig. Welnu dan: uit tal van brieven blijkt, hoeveel belangstelling Ortelius in die nieuwe onderzoekingen en kaarten betoonde. In brief 19 beantwoordt Guilielmus Postellus de door Ortelius tot hem gerichte vragen over den loop van den Niger en de daarvan door Barros en Leo Afer gegeven voorstelling, terwijl de correspondentie der beide mannen tevens over verschillende gedeelten van Noord-Europa en Zuid Oost-Azië, alsmede de verkeerde voorstellingen daarvan bij Ptolemaeus, schijnt geloopen te hebben. Uit brief 29 blijkt, dat hij met Jacobus Nauarchus te Leuven in correspondentie staat over verschillende brieven van Jezuieten uit Indië en Japan, over de zeden der Tataren en de godsdiensten van Azië, ook al naar aanleiding van hetgeen over die Tataren in het Theatrum voorkwam. In den brief van Benedictus Arias Montanus te Rome (n°. 62) is sprake van een "pulcherrimum exemplar descriptionis Synarum regionis a Portogallensi legato" in het bezit van J. B. Raimundus (mathematicus aan de Universiteit te Rome, die de sierlijkste globes maakte). "Id cum a viro impetravero", schrijft Montanus, "tibi mittam ad tuum et publicum usum". Uit brief 99 van Mercator aan Ortelius blijkt dan verder, hoezeer de eerste zich verheugt dat de laatste werkelijk in het bezit daarvan gekomen is, iets waarnaar hij zoo lang verlangd had.

Uit de zoo belangwekkende brieven 100 en 145 blijkt voorts zonneklaar, hoe men Ortelius te Antwerpen, als in onze dagen Petermann, Behm en Supan te Gotha, op de hoogte hield van alle nieuwe reizen, ontdekkingen en publicaties. In den eersten (van 24 Dec. 1580) deelt Egnatio Danti te Rome hem mede, dat hij van groothertog Cosimo twee boeken had ontvangen: het eerste over een reis van Lissabon naar de Molukken, geschreven door een Portugeeschen stuurman (piloto), welke die reis veertien maal maakte en de poolshoogte, het karakter der plaatsen (la qualita di siti) en de afstanden, de diepten der zee en andere bijzonderheden over die vaart had opgeteekend: alles met zooveel zorg, dat, als men dien koers te eeniger tijd mocht vergeten, deze uit dat boek weder zou kunnen

¹⁾ Hun samenwerking te dezen kan blijken uit de zoo juist besproken brieven en uit den brief, d.d. 12 Dec. 1580 door Mercator aan Ortelius gericht (brief 99).

opgemaakt worden. Het andere werk bevatte iets dergelijks voor de West-Indiën. Het eerste had de groothertog van den kardinaal infant van Portugal, het tweede van koning Philips gekregen. Met behulp daarvan was bij bezig voor Zijne Hoogheid een groote wereldkaart te vervaardigen "di quatto braccia di diametro", waarvoor dan zeker dienst hebben moeten doen de kaarten, welke hij in dienzelfden brief aanvraagt, nl. een gekleurde wereldkaart (halfrond) met Azië en Afrika en een van de nieuwe wereld, die Ortelius zou vervaardigd hebben. - In brief 145 d. d. Londen 31 Jan. 1586 houdt Guilielmus Camdenus, nadat hij Ortelius voor de toezending van zijn Theatrum dank heeft gezegd, dezen op de hoogte van Francis Drake's reis naar Amerika, van wien toen, nadat hij de Canarische eilanden (Lanzerote) verlaten had, geen bericht meer was ingekomen. Ook deelde hij hem mede, dat Sir Richard Grenvile een tocht gereed maakte naar Winandichoa (Virginia), waar een jaar te voren een kleine kolonie van Engelschen gesticht was. Bernard Drake en andere mannen uit Devonshire dachten over een reis naar Oost-Indië rondom de kaap de Goede Hoop. Eenige zeelui uit Dartmouth waren van Noord-Amerika terug gekeerd, waar Adriaan Gilbert hen heen gezonden had om de lang gezochte straat te openen. Zij beweren dat zij de straat tot 60° N. B. hebben onderzocht en vandaar in mare del Sur (den grooten Oceaan) zijn aangeland. Velen zeggen dat genoemde Adriaan met de kooplin van de Muscovitische Compagnie overeen gekomen is, deze mannen nogmaals uit te zenden, ten einde de straat wat nauwkeuriger te onderzoeken en dat de kooplui hun levenslang jaarlijks een vaste som hebben toegezegd, als zij langs dien weg de Molukken zouden bereiken. - Dat Mercator en Ortelius over deze en dergelijke berichten, zooals over het zoeken van Pet naar een doorvaart in N. O. richting, nog weder onderling van gedachten wisselden, blijkt duidelijk uit den aanvang vas brief 99.

Doch nog andere brieven wijzen er op, dat Ortellius met de groote mannen op het gebied der geographie en der reizen voeling hield. In brief 172 stelt Ricardus Hakluyt hem voor om ten behoeve van studenten te Oxford en Cambridge en van vele kooplui te London, een gemakkelijk te hanteeren wêreldkaart samen te stellen; in brief 182, van 25 Aug. 1590, bericht Ortelius aan zijn neef, dat Hakluyt hem had uitgenoodigd iets te schrijven over het gedeelte van Amerika tusschen Mexico en het Noorden, waarop hij hem tevens verzoekt Hakluyt het niet onaardige antwoord te geven, dat hij het zou doen, als deze hem [voor dit toen nog 200 onbekend gedeelte] de bouwstoffen leverde. Hij zou er dan diens naam

ervol in vermelden. - In brief 298, van 20 Dec. 1596, schrijft Bernardus Paludanus uit Enkhuizen 1), dat hij Ortelius uit naam van zijn vriend, an Huygen van Linschoten, dank zegt voor den hem bewezen lienst (welken?) en bericht hem, dat Linschoten hem (Ortelius) zijn ,Habitus Indorum Orientalium" alsmede afbeeldingen van eenige boomen in vruchten, die in Indië groeien, zal doen toekomen. In dien brief van Paludanus was, zooals uit het postscriptum blijkt, tevens een brief ran Jan Huyghen zelven aan Ortelius ingesloten, waarschijnlijk in antwoord p de vraag van den laatste naar den afloop der expeditie, die toen n N. O. richting een weg naar Indië had gezocht. "Gij zijt goed ingeicht," schrijft Paludanus, "dat een der schepen, die over de Noordpool en weg naar Indie zochten, is teruggekeerd. Wij hebben bovendien vernomen dat het langs de kusten van Nova Zembla en Groenland tot 34° N. B. gezeild is en dat het slechts een continent en ijs heeft aangeroffen, doch geen straat, zoodat mijn landsman (Linschoten), die dezen ngesloten brief aan U schrijft, bij zijn meening blijft dat op dit terein geen andere bevaarbare straat overblijft dan die, welke vroeger Waigats heette en aan welke hij den naam straat Nassau gaf, daar hij æ het eerst passeerde. Linschoten zal u bij de eerst komende gelegenheid doen weten, welke waarnemingen hij ten opzichte dier straat redaan heeft."

Dat eindelijk Ortelius ook tot dergelijke ondernemingen aanmoedigde en iet opwekken, dus, evenals Petermann, een "agitatorische Krast" uitoesende, tan blijken uit brief 67, door Johannes Dee (Mortlake, 16 Jan. 1577) tot 1em gericht. Nadat hij daarin de diensten, door Ortelius' kaarten en werken aan reizigers, geographen, staatslui en kooplieden bewezen, en liens begeerte om daarin steeds verbetering te brengen ten volle heest

¹⁾ Dezelfde, die hem in zijn brief van 22 Maart 1596 (n°. 285) op de hoogte had tebracht van de mislukte expeditie der Hollanders om door straat Nassau en de IJszee taap Tabin te bereiken. "Toch", zoo geeft Paludanus verder verslag van de te dien opsichte toen in Nederland heerschende meeningen, "toch bestaat hier algemeen de meening (tegenover die van Plancius, welke die straat voor een basi houdt), dat men daar angs China kan bereiken. De Staten in den Haag bespraken de vraag, door welk geleelte van den Oceaan men de Oost het gemakkelijkst zou kunnen bereiken, benoorlen of bezuiden Nova Zembla". Nadat hij daarop de meeningen van hen, die de Noorlelijke of de Zuidelijke route zouden wenschen in te slaan, nader heeft toegelicht, laat iij er deze woorden op volgen: "Dit zijn de voornaamste argumenten van de menschen lie bij ons het terrein bezocht hebben. Tu pro tuo maturo judicio aliquando hac de re uam sententiam nobis communicato!"

erkend en gewaardeerd, laat hij er deze woorden op volgen: "En wat gi op sommige plaatsen van uw kaart van Azië en elders van ons Britten te vragen, ja te eischen schijnt (verbetering en aanvulling dier kaart, mijnerzijds heb ik hen om daarmede toch te beginnen, reeds sedert jaren opgewekt; en dat zij het begonnen werk voltooien, daartoe vermaan, duf en dring ik met alle kracht die in mij is" (vel maxime hortor, insto, urgeo)

Tot zoover Ortelius belangstelling in de nieuwe onderzoekingen zijner dagen.

Lieten tijd en ruimte het ons toe, wij zouden uit de Epistulae Orelianae ook nog gaarne nader hebben toegelicht (wat overigens boven reek voldoende in 't licht werd gesteld), dat Ortelius, vooral in latere jaren, van de klassieke geographie meer bijzonder studie maakte.

Thans zij slechts opgemerkt, dat in een zeer groot aantal brieven tekens op nieuw sprake is van verbeteringen in de kaarten van oud-Spanje, oud-Gallië, oud-Germanië, de oude indeeling van Groot-Brittannië, van Latium, Pannonië, Dacië enz.; dat daarnaast vele brieven opgevuld zijn met berichten over zijne studiën op het gebied van Grieksche en Latijnsche schrijvers of van oude munten en inscripties, allen ten behoeve van zijn Thesaurus of van zijne beschrijvingen, bij de zoo juist genoemde kaarten gevoegd; dat hij zich, weder volgens andere brieven, bezig hield met de routes van Ulysses, van de Argonauten, van Aeneas en van Alexander zoo nauwkeurig mogelijk aan te wijzen; dat hij over het geven van andere namen dan bij Strabo en Ptolemaeus werden aangetroffen, in oorrespondentie trad; en eindelijk, dat hij zich voor het opsporen van de carta Peutingeriana buitengewone moeite getroostte. Vooral over Orteis aandeel in het overwinnen van de daaraan verbonden bezwaren deele onze brieven geen onbelangrijke bijzonderheden mede.

Het zou zeker een gemakkelijke en aangename taak geweest zijn, in het licht te stellen, welke waarde die brieven bezitten om den tijd, waarin Orteliss leefde, en de beroemdste zijner tijdgenooten op bijna elk gebied van wetenschap te leeren kennen. Ook aan aardige bijzonderheden over de gebestenissen en zeden dier dagen zijn die brieven alles behalve arm. Daarde reeds door Tiele met een enkel woord in den Spectator aangetoond is 19

¹⁾ Spect. 1888, p. 231, waar hij op de beteekenis der brieven wijst voor de number matiek, de kunstgeschiedenis en de geschiedenis in 't algemeen, terwijl hij tevens des uitkomen, welke brieven van gewicht zijn om het licht dat zij werpen over Ortelias, zijn karakter en zijne vrienden, de zeden en gewoonten van zijn tijd.

laar ons de bespreking dier brieven meer uitsluitend uit geographisch oogount ten taak werd gesteld, en daar dit artikel reeds eens een zoo grooten
mvang heeft gekregen, wat de welwillende lezer zeker wel uit den rijklom der stof zal willen verklaren, moeten wij om al die redenen die
erdere bespreking aan anderen overlaten. Moge het ons slechts gelukt
ijn, bij den lezer van dit tijdschrift die belangstelling er voor te hebben
pgewekt, welke zij ons hebben ingeboezemd en die zij alleszins verdienen. Treedt daardoor dan tevens de persoon van Ortelius in het juiste licht,
net zal ons hartelijk verheugen mèt bestuurders der Kerk te Londen en
nèt den zoo verdienstelijken bezorger van deze belangrijke brieven althans
enigszins te hebben kunnen medewerken tot het bereiken van het schoone
loel, wat zij met hunne kostbare uitgave beöogden.

ONZE TOPOGRAPHISCHE KAARTEN.

BENE ANTI-KRITIRK

DOOR

S. P. LINDHOUT.

Kapitein der Infanterie.

"Ne Jupiter quidem omnibus."

In den gevel van het Haagde
Raadhuis.

In No. 3 van Deel VII der Tweede Serie van dit Tijdschrift kom: als eerste artikel voor:

"De Chrome-Tepegraphische kaart des Rijks, schaal 1:25,000, Bini "496 (Winterswijk), verkend in 1880 en '86, verschenen in 1889: "de Tepegraphische en Militaire kaart des Rijks, Schaal 1:50,000, "Blad Aalten 41, verkend in 1844, herzien in 1887; en de We-"terstaatskaart, schaal 1:50,000, blad Aalten 2, verkend in 1881, "bewerkt in 1888."

"OP- EN AANMERKINGEN

DOOR

F. E. L. VEEREN."

Wij stellen ons voor nader te onderzoeken, of deze op- en aanmekingen juist zijn.

Beginnen wij met de bewering van den heer Veeren, dat onze topp graphische kaarten zouden lijden aan mindere deugdelijkheid, omdat zi — zegt hij — o. m. grootendeels berusten op kadasterale gegevens. Deze nl. hebben tot grondslag het bestaande secondaire driehoeksne. dat weinig vertrouwbaar is. Tot zoover ongeveer de heer V.

De heer V. is niet de eerste, die te goeder trouw zóó schreef of sprak met betrekking tot onze topographische kaarten. Om het onjuiste er van

aan te toonen zij het ons vergund, iets uitvoeriger te zijn dan de heer Veeren zelf in zijn afkeurend oordeel.

In de vergadering van het "Instituut van Ingenieurs" van den 9den Juni 1881 werd door de heeren van Maanen, ingenieur en Schols, hoogleeraar, eene belangrijke bijdrage geleverd voor de berekening van coördinaten. (Zie bladzijde 134 en volgende van het "Tijdschrift van het Koninklijk Instituut van Ingenieurs", Instituutsjaar 1880—1881). Onder meer sprak de heer Schols:

"Het is te hopen, dat wij eens in het bezit zullen komen van eene "betere secondaire driehoeksmeting, vooral voor de dienst van het ka"daster en voor andere opmetingen op groote schaal".).

Even te voren luidt een zijner conclusiën:

"Uit hetgeen wij straks gezien hebben omtrent de methode, gebruikt "voor de berekening der coördinaten van vele punten van den tweeden "rang, zijn afwijkingen van tien meter en meer te verwachten"²).

Wat zijn nu de gevolgen van hetgeen hier door prof. Schols wordt geconstateerd, voor onze topographische kaarten?

Op de schaal onzer Stafkaart 3) zou zulk eene afwijking van 10 Meter bedragen 1/5 millimeter en op de schaal onzer Chr. Top. kaart 1/25,000 2/5 millimeter. Hier is sprake van punten van den tweeden rang. Voor de gemiddelde zijde eens driehoeks uit het secondaire net kan men stellen 9 Kilometer.

Heeft nu, vragen wij den heer Veeren, de bruikbaarheid, de praktische waarde onzer topographische kaarten iets geleden of kan die ooit iets hebben te lijden, omdat het mogelijk is, dat eenige punten van den tweeden rang niet wiskunstig juist op hunne plaats zouden kunnen komen te liggen? Een vijfde van een millimeter is de dikte eener zwarte lijn op de kaart of iets meer. Is niet, hetgeen prof. Schols op zich zelf als zeer juist en beteekenend constateerde, iets geheel anders dan de gevolgtrekking, door den heer V. gemaakt, als zouden onze topographische kaarten daarom minder deugdelijk zijn? Wij weten niet, of het was op

¹⁾ Wij cursiveeren.

²⁾ Wij cursiveeren.

³⁾ Kortheidshalve zullen wij in dit opstel de "Topographische en Militaire Kaart les Rijks op de schaal van 1:50,000" meermalen aanduiden door den geijkten term: "Stafkaart"; de "Chromo-topographische kaart op de schaal van 1:50,000" en die sop le schaal van 1:25,000" door het verkorte: "Chr. Top. kaart 1/50,000" of "Chr. Top. :aart 1/25,000."

grond der uitspraak van prof. Schols of als herinnering aan iets, dat door anderen vroeger wel eens in algemeene termen werd te berde zebracht over deze quaestie, dat de heer Veeren zijn afkeurend oordeel uitsprak. Doch wat wij wêl weten is dit, dat prof. Schols de zaak, waarover hij zoo scherpzinnig had nagerekend, het oog had op het kadaster — in den regel schaal 1:2,500 — en op andere opmetingen op groote schaal. Over onze topographische kaarten op de schaal van 1:50,000 en 1:25,000 geen woord! Dit laatste nu, het niet-spreken er over, vinden wij echter een te pover argument, om de bewering van den heer Veeren te weerleggen. Hiertoe kunnen wij meer afdoende geraken door met een enkel woord twee andere, eenvoudige omstandigheden te bespreken. Deze zijn:

- 1°. Het rekken en krimpen van het kaartpapier, waarop gedrukt wordt:
 2°. de wijze, waarop het minuutwerk der kaart wordt gemaakt.
- Vóór wij evenwel het een en ander betrekkelijk deze punten in het midden brengen, willen wij ter-loops er nog op wijzen, dat de heer van Maanen (Ingenieur) in diezelfde vergadering van het Instituut constateerde, dat de afwijkingen, te verwachten bij het gebruik eener meer nauwkeurige methode ter berekening der coördinaten van punten van den tweeden rang, zelfs voor onze rivierkaarten 1) geen merk- of meetbare gevolgen kunnen hebben.

1°. Het rekken en krimpen van het kaartpapier, waarop gedrukt word.

Naar mate van het drooge of vochtige der temperatuur, waarin de gedrukte kaart gedurende langeren of korteren tijd wordt bewaard, krimpt of rekt het papier, ook van de goede qualiteiten, in den regel zelfs ta afmetingen, die veelvouden zijn der afwijkingen, hierboven reeds meermalen genoemd en bedoeld (1/5 en 2/5 millimeter). Hoe gelijkslachtig ook de vezel van het papier zij, hoe zorgvuldig ook behandeld bij den druktoch rekt en krimpt het papier daarna. Dit laatste zou alleen zijn te voorkomen, door voor de praktijk het gebruik van kaarten op hard metalen platen in te voeren. Het nuchtere menschelijk verstand zal, 200 wij meenen, dat middel, erger dan de kwaal, wel nimmer te baat nemen. Blijft dus over papier, dat over een kaarten-blad als b. v. onze Stafkaan dikwijls vele millimeters rekt of krimpt en dat nog wel op vaak zer onevenredige wijze in eene zelfde richting van hetzelfde stuk papier. Dit

¹⁾ Schaal 1:10,000. Wij cursiveerden.

alles voor het eerst lezende of overdenkende, vinden sommige personen hun geloof aan de voortreffelijkheid onzer kaarten, reeds zoo dikwijls geroemd, wellicht nog meer verzwakt. Hoe komt men dan b. v., vraagt men D. m. misschien, met eene zoo groot mogelijke nauwkeurigheid den afstand te weten tusschen twee ver van elkander verwijderde punten? Door eene niterst eenvoudige berekening, waartoe als gegevens dienen de opgaven van Tafel II uit de "Meetkunstige Beschrijving van het Koningrijk der Nederlanden." Voor afstanden, uren ver, geeft het gezond verstand van zelf aan, dezen weg te volgen; voor kleinere afstanden wordt dat feit van rekken of krimpen een factor zonder de minste beteekenis en kan men veilig passer of scherp en juist verdeeld meetlineaal ter hand nemen en op de kaart meten.

Als tweede omstandigheid, ter bespreking noodig voor ons betoog, noemden wij

2°. De wijze, waarop het minuutwerk der kaart wordt gemaakt.

Zijn wij ver van de waarheid, wanneer wij veronderstellen, dat de heer Veeren, en velen met hem, in de meening verkeeren, dat, wiskunstig gesproken, het lijnen-net (canevas) der minuutkaart gelijkvormig is met de respectieve teekening op de kadasterale bladen?

Zulk eene meening nu is echter teneenenmale onjuist, alweder wiskunstig geredeneerd. Eene zuivere reductie van het kadaster tot de schaal van het minuutblad, eene reductie, om het zoo eens te noemen, mannetje aan mannetje uitgevoerd, zou eene vrij slecht samengestelde topographische kaart opleveren, ook al werd verder op het terrein uiterst nauwlettend ingeschetst en de kaart daarna goed beschreven (namen en cijfers). Hoe dan de topograaf de kaart maakt?

Een cursus hierover te schrijven is onmogelijk. Wij zouden zulks niet dan zeer onvolledig kunnen doen, ook al konden wij over meer ruimte in dit tijdschrift beschikken, om de zeer eenvoudige reden, dat het métier van terreinopnemen ten dienste eener topographische kaart zeer weinig uit boeken en bijna geheel uit de praktijk dient geleerd te worden. Het zij voldoende, hier alleen aan te stippen, wat wij volstrekt noodig achten tot eenig juist begrip.

Eerstens de prozaische mededeeling, dat een opnemer, om geoefend te heeten, even vaardig en recht-op het doel-af met het radeermes als met pen, trekpen, potlood en penseel moet weten om te gaan.

De minuutbladen, waarop geteekend wordt, zijn 40 c. M. breed en

25 c.M. hoog, van zeer goede papier-quailiteit en geplakt op stevig carton. Al deze cartons, door verschillende handen te bewerken, vormen, aaneengelegd in alle richtingen één doorloopend kaartenvlak. Er wordt geteekend op de schaal van 1:25000, een schaal waarvoor groote scherpte in voorstelling een eerste eisch is. Niet-juiste aansluiting der cartons of dubbelzinnigheid in teekening of kleur of beschrijving hebben dadelijk gevolgen van beteekenis, als men o. m. bedenkt, dat gewichtige terreinpunten, als: wegenknoopen, sluizen en bruggen, hooge heuveltoppen, op de schaal van 1:25000 dikwijls niet meer ruimte dan 1 millimeter — (= 25 Meter) — op de kaart mogen beslaan. Op het blanco-kaartenvlak, gevormd door de verschillende tegen elkander aangesloten cartons, worden, als eerste voorbereiding van den terreinarbeid, door of onder strenge controle van den Directeur der Militaire Verkerningen 1) de verschillende getrianguleerde punten uitgezet - (2den rang en enkele van den 3den rang) - waartoe de gegevens ontleend worden aan de Meetkunstige Beschrijving van het Koninkrijk der Nederlanden. Door den terrein-opnemer wordt tusschen die punten, op zeer nauwgezette doch oordeelkundige wijze, eene reductie-teekening van het kadaster tot de schaal van 1:25000 gebracht. Als wij zeggen op oordeelkundige wijze, dan bedoelen wij tevens daarmede, dat daarbij alle 200genaamde geleerdheid is buitengesloten. Die herleiding vormt eene zeer scherp geteekende potloodteekening. Is zij dit niet, dan komt er weinig goeds van terecht, want veel doornen ontmoet de maagdelijke kaartminuut later op haar weg, vooral wanneer zij weken en maanden lang op het terrein in handen van den verkenner door weer en wind en stofwolken ronddwaalt. Het minuutblad wordt op het terrein zelf gedurende de opname in scherpe potloodlijnen en aanteekeningen verbeterd en aangevuld en daarna dienzelfden of den volgenden dag in het kwartier voorgoed in het net in inkt en in kleuren geteekend. Even duidelijk ak prins Maurits bij Nieuwpoort door het wegzenden zijner schepen zijnen kriigsmakkers aan het verstand bracht, dat slechts op één wijze het doel kon bereikt worden, even zeker is aan den terreinverkenner de vas afgesneden tot het maken van eene tweede kaartminuut, n.l. door het eenvoudige feit, dat een dergelijk stuk, 't welk noodwendig vroege

¹⁾ Het dienstvak der Militaire Verkenningen bestaat tot heden uit een Directeur. Hoofd-Officier van den Generalen Staf, een aan hem toegevoegd Kapitein van den Generalen Staf en tes luitenants, die uit alle wapens worden getrokken, doch bijna akijd herkomstig zijn uit het wapen der infanterie.

zou moeten zijn aangelegd en voorbereid, niet bestaat. Gedurende de eigenlijke terreinverkenning wordt iedere potloodlijn gecontroleerd, op zich zelve beschouwd, maar vooral in verband met het geheel, want juist op dit laatste komt het aan bij eene opname voor eene kaart, die aan alle zijden in alle richtingen moet sluiten, zonder te veel en zonder te weinig. Het gevolg van zulk eene nauwlettende contrôle is dat honderden lijnen, als b. v. niet zichtbare perceelscheidingen, welke voor het kadaster wel, doch voor eene topographische kaart hoegenaamd geen waarde hebben, moeten worden weggenomen. Omgekeerd worden talrijke nieuwe lijnen, b. v. wél zichtbare scheidingen van zelfde of verschillende cultures, terreingolvingen enz. welke niet, of gedeeltelijk, of niet topographisch juist op de kadasterreductie voorkomen, in vorm en verband op hare plaats geteekend. De opnemer maakt bij zijnen terreinarbeid veel gebruik van de rechte lijn, hetzij zichtbaar als grenslijn van terreindeelen, hetzij genomen als verlengde daarvan of over uitstekende, in-het-oog-springende terreinpunten. Geen strenger controleur in een terrein van ongerechtigheden dan de rechte lijn. Goed beschouwd is topographisch opnemen een zeer eenvoudig bedrijf, indien de verkenner zich mag verheugen in een paar onvermoeide beenen, een oog, dat vlug, ver en samenvattend veel ziet en een dosis gezond verstand. Hierbij eenige handigheid om op de schaal van 1:25000 het waargenomene sprekend, zonder eenige dubbelzinnigheid, in zwart en andere kleuren in gelijkend beeld te brengen. Topographen met gelukkigen aanleg hebben niettemin oetening, topographen met minder vluggen blik hebben meer oefening noodig. Beider taak is, eene kaartminuut te maken, waarop tot zekere grenzen alles te zien is, wat het terrein te aanschouwen geeft. Indien de aansluiting der verschillende kadasterale bladen bij de herleiding bleek op menige plaats verre van nauwkeurig te zijn, indien menige rechte lijn, samengesteld uit kadasterlijnen van verschillende bladen, blijkt op het terrein eene gebroken lijn te zijn, of omgekeerd, moet dat alles met al de daaraan verbonden gevolgen op de kaartminnut zóódanig weggewerkt en verbeterd zijn, dat alleen aan den opnemer zelven en aan zijnen chef kan bekend zijn, op welke plaatsen en in welke hoeken de schoen wrong op het kadaster-blad. Zoo wordt ten slotte, in alles verband opsporende en dit in kaart brengende, recht gemaakt wat krom was, en omgekeerd, doch niet in den ongunstigen zin van het woord, zooals men dit meestal pleegt te gebruiken. De kaart in haar geheel wordt in het klein, wat het terrein te aanschouwen geeft in het groot.

De hier bedoelde wijze van werken bij het carteeren van een streek, in alle voor den leek bevattelijke bijzonderheden nader uiteen te zetten in geschrifte, is even weinig uitvoerbaar als een begrijpelijken leergang te schrijven over de wijze, waarop een Veluwsche strooper een hazs vangt. Men moet op dat eenvoudig bedrijf eenig gezicht hebben en zich voortdurend oefenen. Iedere terreinhoek, waarin, van het kadaster uit, eenige ongerechtigheden huizen, wordt gezuiverd daarvan. Iedere fignur, welker samenstellende deelen, op verschillende kadasterbladen voorkomende, niet sloten, wordt door voortgaande insluiting op het terrein zoodanig in het nauw gebracht, dat geen ontkomen meer mogelijk is Ten langen leste is zij gestrikt in den goeden vorm, zooals het terrein dien te aanschouwen geeft.

Wij vleien ons, dat door het voorgaande den heer Veeren eenigszins is duidelijk geworden, hoe wij een niet-in-allen-deele betrouwbaar secondair driehoeksnet kunnen bezitten en toch in het bezit van eene op deugdelijken grondslag samengestelde topographische kaart kunnen geraken.

Apropos van het Kadaster toch nog eene korte uitweiding te dezer plaatse.

Indien uitmuntend geredigeerde, zuivere vak-organen, als b. v. bet "Tijdschrift voor Kadaster en Landmeetkunde" voor het Kadaster mag heeten, meermalen de gebreken van ons kadaster ter sprake brengen, kan dit op den duur niet dan ten goede komen aan die instelling. Is dit echter ook te verwachten, wanneer in enkele woorden tot een goed klinkenden volzin samengesteld, op zeer onbepaalde wijze op die gebreker wordt gewezen? Wij voor ons meenen in ontkennenden zin hierop n moeten antwoorden. Niemand zal het euvel kunnen duiden, wanneer wi beweren, dat 99/100 der lezers, die ambtelijk niet in aanraking komen met het kadaster, dit laatste alleen kennen bij naam. Zelfs bij overiges uitnemend ontwikkelde lezers zullen wij dat in het algemeen gerast kunnen vaststellen. Zijn wij ver van de waarheid, als wij gelooven, dz bij deze ontwikkelde lezers in het algemeen ons kadaster in veel kwader reuk staat dan dit verdient? Wij waren in de gelegenheid ettelijke jaren achtereen duizende kadasterale bladen van verschillende provinciën onde de oogen te hebben, met reductie-passer in de hand, en dan moeten wi toch als onze meening uitspreken, dat onze kadasterale plans over be geheel veel beter en veel nauwkeuriger zijn, dan het groote leeken-publici onderstelt. Deze indruk is bij ons achtergebleven, hoeveel arbeid oos meermalen, op het terrein komende, noodig bleek, om door wegnemier. bijteekening of verbetering één goed gelijkend topographisch beeld z

maken, waarin het verband zat, dat de werkelijkheid te aanschouwen geeft. Men onderscheide toch goed! Wij bezitten tot heden, eigenlijk nog uit den Franschen tijd herkomstig, een zoogenaamd belastingkadaster, dat vrij goed voldoet aan zijne oorspronkelijke bestemming: dienst te doen voor eene gelijkmatige verdeeling en regelmatige heffing der grondbelasting. De voorstanders van eene geheele vernieuwing van het kadaster, gebaseerd op een geheel nieuw secondair driehoeksnet, beoogen het verkrijgen van een zoogenaamd eigendomskadaster, dat dus tevens justitieele waarde zou hebben, en hiernaast een zich geheel daarop baseerend belastingkadaster. Tot zoolang dit eigendomskadaster niet zal zijn tot stand gekomen, is er, naar wij meenen, toch nog geen oogenblik reden tot ongerustheid voor onze belastingschuldigen.

De internationale graadmeting, welker centraal-bureau te Berlijn is gevestigd, zal nog in jaren niet gereed zijn met haren reuzen-arbeid. Het primaire net is nog niet ver genoeg voltooid, om een aanvang te kunnen maken met metingen en berekeningen voor een nieuw secondair net van Nederland ¹).

Gaan wij nu over tot eene bespreking van hetgeen wij verder lezen in de "op- en aanmerkingen."

a. Grenzen.

(Zie Bladzijde 530).

Door den heer V. is waarschijnlijk voorbijgezien, dat op onze Stafkaart onder de benamingen der dorpen, gehuchten en bewoonde oorden de voor- en slotletters der gemeenten, waartoe zij behooren, geplaatst zijn. Daarenboven staan sedert vele jaren alle gemeentegrenzen in gele kleur op onze Chr. Top. kaart 1:50,000. Hiermede vervalt, meenen wij, de noodzakelijkheid, om aan den wensch van den heer V. betreffende "grenzen" te voldoen. Tot de geheimen eener goede cartographie behoort, dat noch te veel, noch te weinig op eene kaart staat. Niets gemakkelijker dan eene kaart, die oorspronkelijk goed mag worden genoemd, door overlading met zwarte lijnen of stippen in den grond te bederven.

Zie omtrent voorbereidingen hiertoe enz. het »Verslag der Rijkscommissie voor graadmeting en waterpassing aangaande hare werkzaamheden gedurende het jaar 1889" Nederlandsche Staatscourant van 10 Juni 1890.

b. Terrein.

(Zie Bladzijde 531).

Langs alle kunstwegen en op vele punten, langs rivieren en kanalen, langs dijken, in polders en droogmakerijen 1) vindt men op de Waterstaatskaart hoogtecijfers. Daarenboven komen op de Stafkaart in verschillende hooge en heuvelachtige streken onderscheidene côtes voor. Niet te ontkennen valt het, dat op meer dan één plaats op de stafkaar nog geen onduidelijkheid zou worden teweeggebracht door de bijvoeging van eenige hoogtecijfers. Daartoe zou, consequent over onze 62 bladen uitgestrekt, evenwel eene nieuwe, uitgebreide secundaire waterpassing noodzakelijk zijn. Deze zou moeten aansluiten aan de Nauwkeurigheidswaterpassing, die tot heden, meenen wij, voor ons land nog niet geheel is voltooid. Afzonderlijk personeel, daarvoor speciaal geschikt, en dus afzonderlijke staatsfondsen, zouden voor dat nieuwe werk noodig zijn. Den heer Veeren en ieder die zegt, het wel te meenen met de Nederlandsche cartographie, moge het gegeven zijn, door woord en daad mede te werken aan het tot stand komen van zulk een nuttigen arbeid! Wij voor ons zien in de dubbeltjes-quaestie den haak, waaraan deze zask, hoezeer men haar ook helpt wenschen, wel immer zal blijven opgehangen. Toch is dit nog geen ramp te noemen voor land of maatschappij. Last ons steeds onderscheiden tusschen iets wat gewenscht en iets wat noodzakelijk is. Met de wijze van voorstelling en aanduiding van hoog en laag terrein op onze topographische kaarten op de schaal van 1:50.000 en 1:25.000 kunnen wij voorloopig tevreden zijn. In dit opzicht vergelijke men b. v. de Nederlandsche met de Duitsche en Fransche Stafkaarten, daarbij niet verzuimende, eene zelfde soort van terreinen in oogenschouw te nemen op de kaart. Men zal dan zien, dat wij niet in de slechtste conditie verkeeren. Ook zij men bij die vergelijking vooral indachtig, dat eene zelfde uitgestrektheid van den bodem op de Nederlandsche, Duitsche en Fransche Stafkaarten in ruimte zich verhouden als 4: 1:21 3.

In polders en droogmakerijën is het aangegeven Zomerpeil zp slechts een benaderend gegeven, omdat men weet, hoe hoog bouwland en weiland in den regel boves dit peil liggen.

Duitsche Stafkaart — Karte des Deutschen Reiches — schaal 1: 100,000. Fransche Stafkaart — Carte topographique de la France — Schaal 1: 80,000.

c. Beken en waterleidingen met daarbij behoorende werken.

(Zie Bladzijde 532).

Het zoogenaamde beekje, in de figuratieve schetsen 3 en 4 voorgesteld door het kronkelende lijntje, onmiddellijk ten oosten van a, is minder juist geteekend door den heer V. Juister geteekend kan men het vinden op onze Waterstaatskaart 1) en tevens in dunne blauwe lijn op onze Chr. Top. kaart 1: 50,000. Het waterlossingje a, door den heer V. bedoeld en door hem vereerd met den naam van beek, voert alleen in het natte voor- of najaar gedurende enkele maanden eenig water af. Te allen tijde, droog of nat, kan de minst vlug-ter-been zijnde soldaat zonder polsstok met pak en zak er overheen springen. Daarom werd het door den opnemer opzettelijk niet in blauwe lijn geteekend op de minuut-kaart. Wel werd het hierop voorgesteld door eene dunne zwarte lijn, tevens een der grenzen van den groenen houtrand, die er tijdens de verkenning langs groeide. Op het minuutblad in kleuren werd dit watergootje gerangschikt onder de familie der drooge greppels. Als zoolanig, in zwarte lijn dus, komt het voor op de gedrukte Chr. Top. taart 1:25,000, Nu kan een eigenaar van gronden, langs zulk een miniatuur-beek gelegen, uit een eigenaardig begrip omtrent de eischen eener topographische kaart op de schaal van 1:25,000, het wellicht verkeerd achten, dat zulk een tijdelijk watergootje niet als blauwe lijn op die kaart werd in teekening gebracht, edoch! de opnemer had, na consciencieuse verkenning en informatie in loco eene andere opvatting. Hem stond alleen voor oogen, wat de bestemming is der kaart voor militaire en andere doeleinden. Het zoogenaamde beekje a had als zoodanig in zijn oog niet de minste topographische beteekenis 2).

l) Op enkele bladen na is de Waterstaatskaart van ons land voltooid. Binnen een paar jaar zal zij geheel gereed zijn.

²⁾ De Chromo-topographische kaart schaal 1:25,000 is verdeeld in 776 bladen. Hierran verschenen tot heden in druk, doch alleen bestemd voor militaire en enkele burgerlijke autoriteiten ± 300 bladen. Van deze zijn tot heden ± 80 bladen, zoogenaamde goedkoope uitgave" (zonder verdedigingswerken) ook verkrijgbaar gesteld voor alle officieren van land- en zeemacht en schutterij, benevens voor alle burgerlijke ambtenaten in dienst van staat, provincie en gemeente, waterschaps- en polderbesturen enz. Voor deze zelfde categorie van personen is tevens verkrijgbaar gesteld de Schets der Chromo-topographische kaart schaal 1:25,000, zijnde een in lichte tint vervaardigde inderdruk dezer kaart. Hiervan verschenen tot heden ± 100 bladen. Omtrent verkrijg-

Om in bijzonderheden den waterstaatkundigen toestand eener streek te leeren kennen, kan men, behalve door eigen aanschouwing op he terrein, de betrekkelijke waterstaatskaart met vrucht raadplegen. Hieron komt ieder waterlossingje, hoe gering ook, voor als eene duidelijk gedrukte, dikke lijn, en wèl in de donkere kleur van de tint, waardoor het gebied is voorgesteld, dat zijn water in verschillende tijden van izt jaar langs dat waterloopje afvoert. De vervaardiging onzer waterstaatkaart is ter hand genomen met het speciale doel, tot in kleine detais den zuiver waterstaatkundigen toestand des lands graphisch voor te stellen Duidelijk kan ieder, die deze kaart kan lezen, o. m. er op zien, hoe a waarop het water afloopt en afgevoerd kan worden. Een terrein-200t, soms langer dan een half uur, die, topographisch gesproken, gedurende 8 of 9 maanden van het jaar slechts een drooge, kronkelende greppel is, wordt op deze kaart toch nog 266 voorgesteld, dat zij sprekend uikomt als waterlossing of beek. Onze topographische kaart zou een vreendsoortig aanzien verkrijgen, indien men daarop dwergbeekjes of gootjes, zooals het bewuste a-beekje, door den heer V. bedoeld, als normak waterloop voorstelde. Consequent zijnde zou dan een zeer groot deel 1218 ons Nederlandsch polderland en van onze lagere heidevelden eveneus door het teeken van overstroomd, nat terrein moeten worden in kaart gebracht, want ieder jaar ziet men die streken in dien toestand gedrrende eenige weken of maanden. Zulke abnormale toestanden van den bodem op gewone topographische kaarten aan te geven, zou echter geheel liggen buiten het doel dezer kaarten en zou ze onleesbaar make De Waterstaatskaart is op dezelfde schaal als de Stafkaart, 1:50,000 De paarsche onderdruk der eerste is een overdruk van de laatste. Vele zuite topographische gegevens, meer of minder sprekend uitgedrukt in paarsch kleur op de Waterstaatskaart, kan men op deze dus als bijzaak, z louter toegist beschouwen. Terrein-détails, op de topographische kast voorkomende, zal men meermalen niet vinden op de Waterstaatskaaren en omgekeerd, een en ander in overeenstemming met het oorspronkelik doel der beide soorten van kaartwerken. Een voorbeeld uit meerdet Op de topographische kaarten is wel eens op een bepaald punt een breg geteekend, terwijl daar op de Waterstaatskaart een stuw is aangedeid. en geen brug. Toch ziet men beiden op het terrein bij of op dat punt.

baar-stelling der verschillende topographische kaarten op de schalen van 1:50,665. 1:25,000 en 1:200,000 verschijnt jaarlijks in December en Januari respectievelijk is het Recueil Militair en in de Staatscourant een overzicht.

De oorzaak van zulk een verschil — wèl te onderscheiden van tegenpraak! — in voorstelling is dan, dat om en bij dat punt reeds zulk een licht net van lijntjes en namen is geteekend, dat de kaart daar onleesgar zou geworden zijn, indien èn brug èn stuw waren aangeduid. Voor le topographische kaart werd de keus van brug, voor de Waterstaatskaart lie van stuw gedaan. Hier was het voor den opnemer volstrekt niet entre ces deux mon coeur balance." De brug behoort daar thuis op de opographische, het stuw op de Waterstaatskaart. Beter eene niet-volledige eesbare kaart, dan eene volledige niet-leesbare kaart. Dit is en blijft iet criterium voor iedere terrein-opname.

Nooit zou onze zuinige minister Thorbecke den last hebben gegeven ot het samenstellen en reproduceeren der Waterstaatskaart, indien het nogelijk ware geweest, een goed leesbaar topographisch en waterstaattundig beeld op één kaart voor te stellen.

In de 2de alinea van onder op bl. 532 zegt de heer Veeren, dat op 187,5 Meter beneden de Huitinkbrug abusievelijk een stuw is geteekend — op de topographische kaart, bedoelt hij blijkbaar. — Hier vergist de heer V. zich. Hij ziet het teeken van vonder aan voor het teeken van stuw. Zie "verklaring der teekens." De stuwen, die volgens hem souden ontbreken vindt men weder op de kaart, waarop zij te huis behooren d. i. op de Waterstaatskaart.

Punt van samenvloeiing der Henxelsche en Ratumsche beken. Waar de heer V. spreekt van 500 Meter moet dit zijn 400 Meter. Zonderling, dat zulke kleine vergissingen nu eens nooit in eene andere richting begaan worden. Waarom kon er nu b. v. niet eens "300 Meter" staan? Doch hieraan willen wij geen waarde hechten. 't Is slechts een opmerking, zoo langs onzen neus gemaakt. Ter zake. 400 Meter dus ligt het bewuste punt van samenvloeiing dier beekjes. op de Chr. Top. kaart ½5,000, te veel westelijk. De opname voor de laatst bedoelde kaart had plaats voor die der Waterstaatskaart. Op deze ligt dat punt wèl juist; daarenboven op de Chr. Top. kaart ½50,000 ook reeds sedert 4 jaren ¹) en bij een herdruk van blad 496 der Chr. Top. kaart ½5,000 zal zeer vermoedelijk dat punt van samenvloeiing eveneens op zijne plaats terecht komen. Bij critiek op kaarten, die over het algemeen uitmuntend bijgewerkt mogen heeten, bedenke men steeds, dat soms geruime tijd ligt tusschen de verkenning van het terrein en de reproductie, waarover

¹⁾ Het grootste gedeelte van ons land is reeds in het licht verschenen als Chromotopographische kaart op de schaal van 1:50,000.

hierna meer. Men kan dit een weinig spijtig vinden, doch bij ons, as overal, zijn zulke toestanden in het kaartenwezen onvermijdelijk. Men vergete nu evenwel niet, dat onze Topographische Inrichting voor gevallen van hoogen nood in staat is, binnen eenige uren of dagen me de opname, talrijke reproducties te vervaardigen langs photographischen en photo-lithographischen weg, nl. alleen in het zwart en zonder andere kleurentinten. De uitvoering van zulke kaartwerken laat natuurlijk in vergelijking van onze officiëele standaard-kaartwerken veel te wenschen over. Daarom gaat men er alleen toe over, wanneer eenig dringend openbaar belang dit eischt.

d. Wegennet.

(Zie Bladzijde 533.)

Betreffende Spoorwegen en Stations verwijzen wij naar het door ons onder & betrekkelijk het speciale doel der waterstaatskaart in het midden gebrachte. Niet alleen zijn de eischen, aan topographische en waterstaatskaarten te stellen, verschillend, doch zelfs is verschil aan te wijzen in de eischen voor de topographische kaart 1:25,000 en die voor de topographische kaart 1:50,000.

Als antwoord op het door den heer V. onder Overwegen opgemerke, diene, dat in die leemte sedert eenige jaren reeds is voorzien. Echer niet juist op de wijze, als door hem werd aangegeven, doch meer is overeenstemming met de schaal der kaart. Zie "Verklaring der teekes Chr. Top. kaart 1: 25,000." Deze verandering wordt dus voortaan ook toegepast op alle nieuw uit te geven of te corrigeeren bladen 1/25,000.

c. Grintwegen.

(Zie Bladzijde 534.)

Wanneer een deel van ons land door de Militaire Verkenningen is is kaart gebracht, wordt het minuutwerk toegezonden aan den Chef van den Generalen Staf. Deze stelt het daarna in handen van den Directer der Topographische Inrichting, waar het voor reproductie in aanmeking komt, zoodra personeel daartoe beschikbaar is. Betreffende de functie dier Inrichting bevelen wij zeer aan de lezing der voordrack. op 24 Januari 1889 gehouden in de "Vereeniging tot beoefening der Krijgswetenschap" onder den titel van "De Productie en de Procesii der Topographische Inrichting" door C. A. Eckstein, Directeur dier In

richting. (IVde Verslag 1888—1889. 's Gravenhage C. v. Doorn & Zoon 1889).

Een ideale toestand zou men het kunnen noemen, wanneer onmiddellijk vóór den herdruk eener kaart eene nieuwe terreinverkenning kon plaats hebben. Dit is echter eene onmogelijkheid, zoowel in andere staten als in Nederland, omdat over geen geschikt en geoefend personeel kan beschikt worden, talrijk genoeg voor zulk eene veelomvattende taak. Ook dit is weder eene geld-quaestie. Indien genoegzame fondsen konden worden toegestaan, zou men bijtijds een talrijk genoeg personeel, zoowel voor de opname als voor de reproductie kunnen opleiden. Dit niet zoo zijnde, is het zaak zoo goed mogelijk en zooveel mogelijk te roeien met de riemen, die men heeft.

In Nederland ligt tusschen twee terreinverkenningen derzelfde streek eene periode van 12 tot 20 jaar. Ten einde in deze tusschenperiode herdrukken eener kaart zooveel mogelijk bijgewerkt in het licht te kunnen doen verschijnen, worden na eene laatste opname, door de Militaire Verkenningen verricht, aan de Topographische Inrichting zooveel mogelijk gegevens omtrent hoofdzaken verzameld. De topographische waarde van zulke gegevens staat uit den aard der zaak beneden het werk der Militaire Verkenningen. Toch is de waarde ervan niet gering te schatten. Zij maken het mogelijk steeds vrij wel bijgewerkte herdrukken te kunnen leveren. Tot de goede gegevens van die categorie behooren de nieuwste hydrographische kaarten, rivierkaarten en waterstaatskaarten. Nog komen tweemaal per jaar opgaven in omtrent de uitbreiding van het kunstwegen- en kanalennet, den bouw van groote sluizen enz. Niet onmogelijk dat een dezer opgaven wel eens minder nauwkeurig verstrekt werd. Dit verklaart een geval, als waarop door den heer V. gewezen wordt onder Grintwegen (Bl. 534) in de tweede, derde en zevende alinea.

Betrekkelijk den grintweg, bedoeld in de 4de alinea zij opgemerkt, dat, naar wij uit goede bron vernemen, de opgave daarvan inkwam, nadat de laatste Topographische en Militaire kaart 1:50,000 Blad Aalten reeds sedert een jaar in het licht was verschenen. Deze kaart verscheen in 1887 en de opgave kwam eerst een jaar daarna in. Het is dus duidelijk, dat die grintweg, tot heden op de gedrukte kaart slechts als zandweg voorgesteld, eerst bij een volgenden herdruk in het teeken van grintweg zal voorkomen. De heer V. zal nu waarschijnlijk hebben begrepen, dat het onvermijdelijk is, meer dan één blad der twee-en-zestig stafbladen eerst na twee, drie of meer jaren te herdrukken; althans in gewone omstandigheden.

De parallelweg, bedoeld in de 5de alinea onder Grintwegen, was, naar wij van welingelichte zijde vernemen, tijdens de opname in 1881 een zer bruikbare harde weg (kolen en gruis). Dit soort van wegen n.l. wordt in de wijze van voorstelling meermalen gerangschikt onder de kunstwegen, indien de informatiën, ter plaatse ingewonnen, het zeer wazschijnlijk doen achten, dat zulke wegen ook in de eerstvolgende jaren in harden toestand zullen worden onderhouden. Bedoeld parallelwege is na de terrein-verkenning als harde weg blijkbaar verwaarloosd in afwijking van de aanvankelijke voornemens. Wij twijfelen niet, of het is thans weder geheel te rangschikken onder de zandwegen, zooals wij van den heer V. vernemen.

Wij vertrouwen, dat de onpartijdige lezer thans zelf de waarde kan beöordeelen van alle opmerkingen, betreffende grintwegen door den heer V. gemaakt.

f. Zandwegen en voetpaden.

(Zie Bladzijde 535).

In de verschillende Europeesche kaarteninstituten worden, sedert ongeveer twintig jaar, aanzienlijke werkkrachten gebruikt voor de correctie der eenmaal bestaande steenen of platen der stafkaarten. Correctie van lithographische steenen is een moeilijke en tijdroovende arbeid. Om der tijd en de kosten, daaraan verbonden, wordt niet dan hoog noodzakehik overgegaan tot de gravure van een nieuwen steen. Toch, hoezeer correctie veel tijd doet winnen, voor een groot kaartwerk als onze Stafkaart – 62 bladen — in zijn geheel, mag het een reuzenwerk heeten. Met marmotten-geduld moet het onafgebroken worden voortgezet en nauwlijks is een steen bijgewerkt of men staat voor nieuwe veranderingen. Men street naar het volmaakte, doch ook hier bereikt men het nimmer. Si l'on n'a pas ce qu'on aime, il faut aimer ce qu'on a.

Een der groote verdiensten van den tegenwoordigen Directeur der Topographische Inrichting zal steeds blijven, dat hij zijn land aanzenlijke sommen heeft bespaard door de verschillende vindingen en toe passingen, waardoor de uitgebreide correctiën mogelijk worden gemaakt en de verbeterde kaarten spoedig in het licht kunnen verschijnen. Doch hoe betrekkelijk snel hierbij ook alles in het werk gaat, de meesse kaarten-correctiën blijven veel krachten en tijd verslinden, zij blijven uitjidroovender, naarmate eene kaart in één of meer kleuren moet gereproduceerd worden. Men bedenke, dat aan één lithographischen stees

met succes door niet meer dan één graveur te gelijk kan worden gewerkt. Ook de beste opmerker kan zich slechts een flauw denkbeeld vormen van den omvang der veranderingen, die in eene tijdruimte van 25 jaren in de meeste onzer terreinen hebben plaats gegrepen, indien hij althans niet in het kaartenmetier-zelf leeft. De aanleg van vele en groote nieuwe kunst- en waterwegen, spoorwegen, boschcultuur en heideontginning hebben gedurende de laatste kwart-eeuw over een groot deel van onzen vaderlandschen bodem eene ware revolutie gebracht. Door eigen aanschouwing en vergelijking op het terrein het meest, doch door een geöefenden blik op oude en nieuwe kaart toch nog vrij duidelijk, springen die vele en velerlei veranderingen van den bodem in het oog.

Naar het minuutwerk op de schaal van 1:25,000 der laatste jaren worden voor onze topographische kaarten op de schaal van 1:25,000 in den regel alle correctien tot in kleine bijzonderheden op steen uitgevoerd. Voor onze topographische kaarten op de schaal van 1:50,000 zou eene dergelijke wijze van corrigeeren tot in duizende kleine topographische bijzonderheden echter ten gevolge hebben, dat men nooit gereed kwam met vele onzer stafbladen. Om bij tijds een blad, waaraan voor de defensie of maatschappelijke belangen behoefte bestaat, verbeterd in het licht te kunnen geven, is het allernoodzakelijkst gebleken, wèl alle hoofdzaken, doch niet alle détails op den steen te corrigeeren, osschoon het getal der verbeterde détails toch nog legio blijft. Een aanvoerder, die eene militaire opdracht heeft te vervullen, zal in negen-ennegentig van de honderd gevallen te laat komen, indien hij het "voorwaarts" eerst uitspreekt, nadat het laatste knoopsgat aan een rok zijner soldaten is hersteld. Evenzoo is het gesteld met het "vooruit" in onze stafkaarten--correctie. Echter wordt, ook al blijft beperking in de correctie noodzakelijk, ieder jaar een stap verder gedaan in de richting van volledige verbetering. Ongetwijfeld zal men het begrijpelijk vinden, dat in sommige heideen houtstreken niet alle zandwegjes, karresporen en voetpaden op de verbeterde stafkaart kunnen voorkomen. Wel vindt men ze alle op de betrekkelijke chromo-topographische kaarten 1:25,000, die getrouw zijn bijgewerkt naar het minuutblad van den opnemer. De heer Veeren zelf roemt deze kaart als zoodanig, al spreekt hij alleen van N°. 496. De voortreffelijkheid van dit kaartwerk is dan ook van algemeene bekendheid. Ook is het waar, dat, ook wat bijhouding betreft, de Nederlandsche topographische kaarten, in haar geheel, gerekend worden tot de beste der bestaande officiëele kaartwerken. Zonder toe te geven aan nationale ijdeltuiterij kan men dit veilig aannemen en gelooven.

g. Bebouwing van het terrein.

(Zie Bladzijde 535).

Over het punt van samenvloeiing der Ratumsche en Henxelsche beken spraken wij reeds voldoende uitvoerig onder c. Beken en waterleidingen ens. Het door den heer V. onder Bebouwing van het terrein verder opgemente betreffende onze kaarten op de schaal van 1:50,000 is, vertrouwen wij, onzerzijds voldoende toegelicht in hetgeen wij schreven onder f en c.

h. Heeven, verspreide huizen enz.

(Zie Bladzijde 535).

Met lof spreekt de heer V. over onze Chr. Top. kaart 1/25,000, ook te dezen opzichte. En wat de Stafkaart in dit opzicht volgens zijne meening onvolledigs bezit, wordt weder zeer natuurlijk verklaard door de tijdroovende moeilijkheden in de correctie voor die schaal, waarop wij hiervoren reeds met enkele woorden wezen.

"Aan een boom, zoo vol geladen, "Mist men vijf, zes pruimpjes niet",

bedenke men overigens!

Bij iederen volgenden herdruk zullen vermoedelijk minder pruimpjes gemist worden in den vorm van huisnamen.

Zoo naderen wij het eind onzer bespreking van des heeren Veeren's

Ons doel was, voor den onpartijdigen lezer in het licht te stellen, dat de kritiek van den heer V. is ôf onjuist, ôf voorbarig, ôf onvoldoende, het een zoowel als het ander het gevolg van 1°. uiterst geringe bekendheid met den gang van zaken bij den topographischen en cartographischen dienst in Nederland, 2°. eigenaardige opvattingen omtrent de eischen, aan verschillende soorten van kaarten te stellen.

Of wij dan de officieele Nederlandsche cartographie verheven achten boven kritiek? In geenen deele. Doch die kritiek zij rationeel, zij houde rekening met bestaande toestanden. Al is in ons oog de hoogste prijs van ons kaartenwezen, dat het streeft naar volmaking met het bewustzijn, dat deze nooit kan bereikt worden, dan sluit dit toch niet uit, dat vooral in de laatste 20 jaren de Nederlandsche cartographie verdient gerekend

te worden onder de beste voortbrengselen op dat gebied. Ieder, die uit neiging of krachtens zijn ambt, een grooter of kleiner deel van zijn leven besteedde, om op de hoogte te komen van het Nederlandsche en buitenlandsche kaartenwezen, beaamt dit ten volle. Hij is daarbij vervuld van eerbied voor de reusachtige vorderingen, gedurende de laatst verloopen eeuw door alle staten op het gebied der eigenlijke topographische kaarten gemaakt. Het loont werkelijk de moeite, wanneer men daartoe in de gelegenheid is, te snuffelen in alle hoeken van kaartenarchieven. Hoevele fragmenten en aanteekeningen leveren dan het bewijs, dat ons geslacht, zonder daarom recht te hebben tot stilzitten, met voldoening mag neerzien op de ontzaggelijke vorderingen, gemaakt sedert het midden der voorgaande eeuw! Toch blijven de primitieve kaartenproducten uit die dagen in haar soort te bewonderen, wanneer men er op let, hoe men zich toen moest behelpen met gebrekkige instrumenten en gebrekkige toepassingen in het algemeen voor opname en reproductie. Ook de officiëele steun van regeeringslichamen liet toen veel te wenschen over. Is dat alles niet een reden, om te mogen verwachten, dat kritiek op onze kaarten uiterst bedachtzaam, met kennis van zaken worde uitgeoesend?

Gaarne zouden wij te dezer gelegenheid nog meer willen uitweiden over de beteekenis, die de Nederlandsche Cartographie naar onze bescheiden meening toekomt in de waardeering van het publiek, juist nu wij overtuigd zijn, dat niet ieder lezer de kaarten bij de hand had en over genoeg tijd kon beschikken, om te controleeren, wat de heer V. schreef; want men vergete niet, dat de indruk van geschreven "op- en aanmerkingen" als deze, alleen gelesen, merkwaardig anders is dan gesien op de kaarten zelven. Wij ondervonden dit, voor dat wij de kaarten ter hand namen tot nader onderzoek.

Ieder, die waarachtig belang stelt in den bloei van onze cartographie, trachte dien in grooter of kleiner kring te helpen bevorderen. Tegenwoordig kan men veilig aannemen, dat voortdurend meer en beter bijgewerkte kaarten het licht zullen zien, naarmate jaarlijks door de Staten-Generaal eenige meerdere gelden worden toegestaan, zoowel voor de eigenlijke opname als voor de verdere redactie en reproductie der kaart. Al kan niet iedereen weten en opmerken, hoe jaarlijks bij duizenden van exemplaren de verschillende bladen der verschillende officiëele kaarten haar weg vinden in onze burgerlijke en militaire maatschappij, toch is dit een feit, op zich zelf van beteekenis genoeg, om te beweren, dat zij veel nut stichten. Hoeveel groote werken van openbaar nut als b. v.

aanleg van spoorwegen en kanalen, zouden niet aanzienlijk meer tijd en geld gevorderd hebben, indien men voor de voorbereiding niet had kunnen gebruik maken van onze nieuwste kaarten! Hoevele grondbezitters en hoeveel duizende particulieren waardeeren nauwlijks meer, dat voor een spotprijs eene uitmuntende kaart kan worden gekocht!

Nog zij er op gewezen, dat alle particuliere cartographie rechtstreeks en niet-rechtstreeks, doch in elk geval in ruime mate, profiteert van het officiëele kaartenwezen. Van de vele militaire belangen, bij onze topographische kaarten betrokken, spreken wij niet eens. Dit is te overbekend en komt dagelijks duidelijk op velerlei wijze aan den dag.

In Nederland evenmin als elders kan ooit een geheel voltooid groot topographisch kaartwerk geleverd worden. Men zij tevreden met de wetenschap, dat met inspanning van alle krachten, door nieuwe vindingen en toepassingen ieder jaar meer getracht wordt onze topographische kaarten te doen beantwoorden aan de hoogste eischen, die men redelijkerwijs daaraan kan stellen.

De 4de alinea van het opstel des heeren V. bl. 529 onderaan en bl. 530 bovenaan, geeft ons aanleiding tot een afzonderlijk slotwoord. Daarin wordt in merkwaardig beknopten vorm gesproken over methode van opnemen, ervaring daarin, benevens het opvatten van hunne taak door de officieren-verkenners. Hierop een paar kantteekeningen.

Vele jaren achtereen hadden wij het genoegen van nabij kennis te maken met het bescheiden doch nuttige dienstvak der Militaire Verkenningen. Op grond dier ervaring staat bij ons de overtuiging vast, dat, wil men goede topographische kaarten verkrijgen, geene wijze van werken kan gevolgd worden, zakelijker en meer nauwkeurig dan de methode der officieren-opnemers. Deze heeft sterke familietrekken met hetgeen de Schr. als iets nieuws in een paar regels zeer algemeen formuleert als de goede weg. Die algemeene aanwijzing versterkt ons te meer in de meening, dat de heer V. tot nog toe niet in de gelegenheid was, iets te weten te komen omtrent die methode, reeds sedert vele jaren gevolgd. Evenwel, het komt geen oogenblik in ons op, hem dit euvel te duiden. Non omnia possumus omnes, zeiden reeds de Ouden.

Omtrent het punt van oesening, ervaring in het opnemen, door den Schr. ter sprake gebracht, zij medegedeeld, dat geen officier-verkenner — zooals men het noemt — "naar buiten wordt gezonden," om eene zelfstandige opdracht te vervullen, dan na een welgeslaagden proestijd van een jaar, gedurende welken tijd hij voortdurend onder het oog en het strenge toezicht der Directie van het dienstvak werkzaam is. Indien n

niet het gevolg zijn van mindere ervaring, mindere geoefendheid in het opnemen, dan zijn, volgens de overtuiging (sic!) van den heer V. al de door hem bedoelde ongerechtigheden in de topographische kaarten toe te schrijven aan het "soms wat al te licht opvatten der taak door den officier-verkenner."

Tegen eene verdachtmaking, als hier werd neergeschreven, teekenen wij protest aan. "Licht de zaken opvatten" is, de heer V. begrijpe dit wêl! eene uitdrukking, die nergens voorkomt in het woordenboek van den officier-verkenner. De bevoegde beoordeelaars in de personen der opvolgende Directeuren-Chefs en de onwraakbare getuigen in den vorm van deugdelijk minuutwerk zijn daar, om te bewijzen, dat een officierverkenner bezield is door een hoog plichtbesef. Ook al zoude een "soms wat licht opvatten" der taak niet onmogelijk worden gemaakt door de organisatie van het dienstvak en de wijze van werken bij de Militaire Verkenningen, dan nog zou zulk eene laakbare ambtsvervulling niet overeenkomen met het plichtgevoel van den opnemer, dat hoog genoeg is ontwikkeld, om zich gevrijwaard te mogen rekenen tegen eene verdenking, zooals die zwart op wit staat uitgedrukt in het artikel van den heer Veeren. Uit déférentie voor de Redactie en den lezer van dit tijdschrift zullen wij niet uitvoeriger zijn in ons protest.

Wij betreuren het in elk geval, dat die woorden den Schr. uit de pen vloeiden, te meer nu wij vertrouwen, door onze anti-kritiek aangetoond te hebben, dat de gevolgtrekkingen, door den heer V. gemaakt, berustten op zeer onvoldoende praemissen.

's Gravenhage, 1 November 1890.

EENIGE OPMERKINGEN NAAR AANLEIDING VAN Dr. B. HAGEN'S BE-SCHRIJVING DER PLANTEN- EN DIERENWERELD VAN DELL

(Overgenomen uit de Deli-Courant van 23 Juli 1890).

Onlangs gewerd mij de 10 aflevering van deel VII van het Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap te Amsterdam, waarin, het voor de kennis van fauna en flora zoo hoogst belangrijk, artikel van Dr. B. Hagen "Die Pflanzen-und Thierwelt von Deli auf der Ostkuste Sumatra's."

Al lezende maakte ik eenige aanteekingen die ik mij veroorloof hierbij aan het oordeel van Dr. Hagen te onderwerpen.

Op blz. 67 wordt opgemerkt dat van het voorkomen van Simia Satyrus (de orang oetan of mawas der Maleiers), zuidelijker dan Tapanoelie aan de Westkust van Sumatra en Deli op de Oostkust, niets bekend is, zoodat met eenige verwondering vernomen werd, dat voor eenige jaren de Rotterdamsche diergaarde een exemplaar rijk was, afkomstig van de binnenlanden van Padang, waarbij dan de vraag wordt gesteld of dat dier niet van de noordelijke deelen der kust zou kunnen zijn aangebracht. Ik meen echter te moeten opmerken, dat in een artikel voorkomende in deel III pg. 138 van het Tijdschrift van het binnenlandsch bestuur, getiteld: Tocht naar het rijk van Poeloe Lawas; onderzoek van het stroomgebied der Battang Nila, door den oud-ambtenaar van het mijnwezen L. H., de volgende aanteekening voorkomt:

"15 Augustus. 's Namiddags vertrokken naar Poeloe Lawan, geen bizonderheden aangetroffen dan de zekerheid nu te weten dat de Simis Satyrus, de orang oetan van Borneo, ook hier voorkomt. Ik had eet dier onder schot, doch niets bij mij hebbende om de huid te prepareeren, spaarde ik hem het leven."

In hoever dit bericht volkomen te vertrouwen is, kan door mij niet worden nagegaan; eenige reserve is wellicht wenschelijk, naar aanleiding van de bemerkingen op dat artikel gemaakt door den Controleur Sieburgh in hetzelide deel van bovengenoemd tijdschrift p. 411 1).

Op mijn tegenwoordige standplaats vernam ik echter, dat ongeveer

¹⁾ Sedert gaf de heer L. H. in de Deli-Courant, nummer van 30 Juli j.l. de versekering dat hij den orang oetan in de binnenlanden van Borneo te goed heeft leerst kennen om zich in het voorkomen van dat dier te kunnen vergissen.

18 à 20 jaren geleden, een mawas moet geschoten zijn in de bosschen op de bergen, die het meer van Manindjau (Padangsche Bovenlanden) omringen, erwijl ouden van dagen zich weten te herinneren den mawas, ofschoon oen reeds zeer zeldzaam, gezien te hebben in de bosschen op den Boerit Silajang, een berg in de nabijheid van Loeboek Basoeng gegen.

Op grond van een en ander meen ik het er voor te moeten houden, lat het laatste woord omtrent de verbreiding van Simia Satyrus nog niet is gesproken.

Op pg. 84 wordt omtrent Macacus Nemestrinus, den baroek der Maleiers van de Padangsche Bovenlanden (Dr. Hagen schrijft bru, ware barûk niet wenschelijker?) opgemerkt, dat dat dier slechts zelten in staat is meer dan 3 klappernoten achter elkander te plukken; dat de 3e klappernoot hem toebehoort, wat hij zoo goed weet, dat hij, naar Maleiers den heer Hagen verzekerden, "strike" maakte, indien men hem dien klappernoot niet gaf.

Wij, die bijna 14 jaren in het land van den klapperaap verbleven, kunnen, tenzij de baroek van de Oostkust zooveel minder "leistungs-khig" is dan zijn collega van de Westkust, den heer Hagen verzekeren, dat een volwassen exemplaar minstens 50 stuks achter elkander kan plukken; natuurlijk hangt de hoeveelheid af van de meerdere of mindere gemakkelijkheid waarmede de klappernoten zich laten losdraaien, het al dan niet aanwezig zijn van roode mieren in den boom enz.

Hij die trouwens den klapperaap in zijn bedrijf heeft gadegeslagen, weet, dat hij de noten nimmer achter elkander losdraait, doch telkens door zijn baas moet aangewakkerd worden, daar hij intusschen in den boom zit te spelen, rond te kijken enz.

En dat elke derde klappernoot zou gegeven worden aan den aap, houden wij voor een vertelsel; ter Sumatra's Westkust, in de Padangsche Benedenlanden althans, is het nog niet eens regel, dat men den plukkenden aap er één voor zijn moeite geeft, terwijl van het geven van één op elke drie noten geen sprake is.

De Midden-Sumatra Expeditie (Reizen, 10 gedeelte, p. 192), over den klapperaap sprekende, teekent aan, dat: "zijne diensten worden den eigenaar beloond door een of twee vruchten van iederen behandelden boom."

Waar nu den eigenaar slechts één of twee noten van elken boom worden gegeven, behoeft het wel geen betoog, dat er voor den aap niet 1 stuk op elke 3 kan overschieten. Men leze verder de beschrijving bij

Bickmore "Reizen in den Oost-Indischen Archipel" vertaald door de Hollander, p. 195 en vlg. van het 20 deel.

Op p. 84 schrijft Dr. Hagen, bukang als de Maleische naam van den luiaard.

Wij wagen de onderstelling, dat dit poekang moet zijn en dat de heer Hagen zich, in weerwil van het hem bekende euvel (zie p. 93, noot) door zijn Zuid-Duitsch gehoor heeft laten verschalken.

- p. 101 leze men voor ketjang, kidjang.
- p. 102 voor blandoh, palandoek.
- p. 105 voor bahdak, badak.

Op p. 132 merkt Dr. Hagen op dat palaeornis longicauda op de Westkust van Sumatra schijnt te ontbreken, daar noch Dr. Klasi's Catalogus, noch de Midden-Sumatra Expeditie van dat dier gewag maakt.

Ik kan echter de verzekering geven, dat de bajan wel degelijk ter Westkust van Sumatra voorkomt; ik zelf had ze dikwijls in gevangen staat toen ik controleur te Sidjoendjoeng (Zuidelijke Padangsche Boverlanden) was, alwaar het dier in de bosschen van Loeboek Tarab, of schoon niet veelvuldig, voorkomt. Het was een aardige langstaartige (zooals het tweede lid van den Latijnschen naam trouwens aanduidt groene parkiet, die snaterde als een beginnende kanarie, doch zelden langer dan een maand in het leven was te houden.

De Midden-Sumatra Expeditie maakt van den bajan in het over de Natuurlijke Historie handelende deel geen gewag; evenwel trof zij het dier aan in Palembang — vide Reisverhaal deel II, p. 240 — ook Wallace, zie p. 220 van Veth's vertaling, deel I.

Op p. 149 wijst Dr. Hagen op de merkwaardige omstandigheid, dat noch de Midden-Sumatra Expeditie noch Dr. Klasi exemplaren væde Dicaeiden op de westkust van Sumatra hebben gevonden.

Toch komen zij er voor; de catalogus der Afdeeling Nederlandsche Koloniën van de Amsterdamsche tentoonstelling, groep I, 6de klasse p. 138, 2de kolom maakt o. a. gewag van dicaeum cantillans, behoord hebbende tot de collectie von Faber en in de Padangsche Benedenlanden (Priaman) geschoten.

- P. 163 moet voor pujo zeker wel gelezen worden poejoeh.
- P. 185—186. Wat Hagen hier omtrent crocodilus biporcatus zegt, n.l. dat hij een exemplaar, dat men hem had aangebracht, des nachts een steunend gebrul, evenals het verwijderd loeien eener koe, hoorde maken, acht ik belangrijk, dewijl daardoor de juistheid van de

issing van Mohnicke in zijn "Banka und Palembang nebst Littheilungen über Sumatra im Allgemeinen," Münster 1874, Is zouden de volwassen exemplaren door het geheel vastgroeien van le tong aan punt en randen aan de onderkaak — hetgeen slechts in involkomen mate het geval zou zijn met de jongere — geen geuid kunnen voortbrengen, geheel wordt teniet gedaan.

Een voorbeeld van verbroedering van krokodil en mensch (zij het dan ook van den kleinen-) gaf ons Mohnicke reeds in zijn zooeven gewoemd werk, waar hij beschrijft zelf gezien te hebben, dat kinderen aan len oever eener rivier schrijlings op den rug van krokodillen gingen itten en in de beste verstandhouding met deze dieren leefden.

Loeboek Basoeng, (Padangsche Benedenlanden) 28 Juni 1890.

TWISS,

Controleur 1s klasse.

NIEUWE UITGAVEN.

Jules Borelli. Ethiopie méridionale, journal de mon voyage aux pays Amhara, Oromo et Sidama. Septembre 1885 à Novembre 1888. Paris. Quantin. 1890. Prijs f 16.50.

Het eerste gedeelte van dit, geheel als dagboek ingerichte en met talrijke afbeeldingen voorziene werk, bevat de beschrijving der reis van Calro naar Ankober door de Afar-woestijn; in het tweede wordt het verblijf te Sjoa (16 Juni 1886—30 April 1887) geschilderd. Het derde gedeelte omvat den tocht van Antoto naar Harrar en terug, alsmede het tweede verblijf van Borelli te Sjoa, een en ander gedurende het tijdperk I Mei 1887—8 November 1887. Eindelijk geeft de schrijver, in het vierde gedeelte van zijn werk, een overzicht van zijne onderzoekingen in het zuiden (van Ethiopie) en van zijn terugkeer naar Calro (9 Nov. 1887—21 Nov. 1888). Het werk bevat vele bijlagen.

Stemmen uit en over de Zuid-Afrikaansche Republiek. Overdrukken uitgegeven door het Bestuur der Nederlandsch-Zuid-Afrikaansche Vereeniging. Amsterdam, J. H. de Bussy 1890. Deze brochure van 38 pp. bevat twee opstellen over Harting-beurzen, door een oud-emigrant en door W., alsmede een overzicht der "Transvaalsche Zaken in 1890," door Prof. C. B. Spruyt, waarin eenige beschouwin-

gen worden gegeven over de staatkundige en de maatschappelijke toestanden in de Zuid-Afrikaansche republiek en over de verhouding van het Hollandsch element der bevolking tot het Engelsche en tot de vreemdelingen in het algemeen.

Ren kijkje in Java, door A. Weruméus Buning — Uitgegeven door de Maatschappij tot Nut van 't algemeen. — 31 pp. Dit werkje bevat onderhoudend geschreven, populaire schetsen van het Javaansche landschap en van het leven van den eenvoudigen Javaan.

Rotterdam's Museum voor land en volkenkunde en het Maritiem Museum "Prins Hendrik"; de weg er heen, doel en strekking, beschreven door A. Weruméus Buning. Rotterdam 1890. 22 pp.

De heer Weruméus Buning, vervuld van liefde voor het door hem bestuurde museum en overtuigd van het nut dat zulk een "aanschouwingsmiddel" — om het eens zoo te noemen — oplevert, geeft een beknopt, populair overzicht van datgene wat het museum bevat. Het werkje is bestemd om zooveel mogelijk verspreid te worden, ten einde het groote publiek tot een bezoek uit te noodigen.

Karl W. Hiersemann in Leipzig. Catalog. n° 72. Linguistik, Ethnographie, Geschichte, Geographie, Kunst des Orients und des europäischen Nordens und Ostens. 1890—1891.

Mededeelingen van het Bestuur des Genootschaps.

Het Bestuur heeft de hier volgende bescheiden ontvangen betreffende een internationaal geographisch congres dat in 1891 te Bern gehouden zal worden. Het Bestuur heeft doen weten dat ons Genootschap, als zoodanig, aan het congres zal deelnemen.

BERNE, le 21 juillet 1890.

Monsieur le Président,

La Société de Géographie de Berne a reçu la communication, que l'offre qu'elle a faite, l'an dernier, à Paris, de se charger du Congrès international des sciences géographiques pour l'année 1891, a été acceptée.

Ce Congrès aura donc lieu l'année prochaine, au commencement da mois d'août, à Berne.

Veuillez en informer la société dont vous dirigez les travaux, ainsi que les savants, géographes et explorateurs avec lesquels vous êtes en relation. Nous vous serions reconnaissants si vous donniez quelque publicité à notre entreprise au moyen de la presse.

Notre comité d'organisation arrêtera sous peu le programme du Congrès; il vous en sera adressé de suite un nombre suffisant d'exemplaires.

Vous pouvez dès à présent nous aviser, si votre société, comme telle, ou quelques-uns de ses membres individuellement, prendront part au Congrès, comme aussi nous communiquer vos vœux quant au programme et les questions que vous désirez voir traiter. Il nous serait très agréable que ces communications se fissent avant l'élaboration du programme.

Nous comptons, Monsieur, sur votre appui et votre précieux concours et vous présentons l'expression de nos sentiments les plus distingués.

Le Président de la Société de Géographie de Berne: Dr. GOBAT, Conseiller d'état.

Le Secrétaire:

C. H. MANN.

BERNE, le 16 Septembre 1890.

Monsieur,

Nous avons l'honneur, pour faire suite à la lettre-circulaire de la société de géographie de Berne, du 21 juillet dernier, de porter à votre connaissance les décisions suivantes prises par le comité des sociétes suisses de géographie pour l'organisation du Congrès international des sciences géographiques de 1891.

Le Congrès aura lieu du Lundi 10 au Samedi 15 août 1891, à l'occasion des fêtes commémoratives du septième centenaire de la fondation de la ville de Berne.

Les orateurs pourront s'exprimer dans leur langue; il sera pourvu à

¹⁾ Membres: MM. Gobat, président de la société de géographie de Berne, Onken, professeur, Haller, imprimeur, Graf, professeur, Mann, rédacteur, tous à Berne, Maret, président de la société de géographie de Ncuchâtel, Knapp, professeur, Neuchâtel, Bouthilier de Beaumont, président honoraire et A. de Claparède, secrétaire général de la société de géographie de Genève, Dr. Staehelin, président de la société de géographie d'Aarau et Buhrer, négociant à Aarau.

ce que tous les discours prononcés en allemand, en anglais et en italien soient résumés séance tenante en français.

Les communications se feront dans la règle en séance générale. Un sujet ne sera renvoyé à une discussion de groupe, qu'a la demande de celui qui l'expose ou d'un nombre suffisant de membres du Congrès.

Les sciences géographiques qui formeront l'objet des délibérations sont réparties dans les divisions suivantes:

I.

Géographie technique.

Géographie mathématique. Géodésie. Instruments de précision, chronomètres, etc. Topographie et cartographie. Projections. Dessin de cartes. Canevas de cartes, plans, panoramas et photographies. Reliefs. Photographie et planchette photographique. Unification du temps. Détermination de l'heure universelle. Détermation d'un premier méridien universel. Histoire de la cartographie. Orthographe des noms géographiques.

II.

Géographie physique.

Configuration du terrain. Hypsométrie. Hydrographie. Géographie maritime. Météorologie générale et speciale. Variations du climat. Les périodes glaciaires. Phénomènes météorologiques et climatériques. Observatoires et stations météorologiques. Magnétisme terrestre. Géographie botanique. Géographie zoölogique. Géographie géologique. Volcans. Tremblements de terre et leurs aires. Sismographie. Ethnographie. Anthropologie. Langues et leurs délimitations géographiques. Géographie archéologique.

III.

Géographie commerciale.

Géographie économique:

Population. Emigration. Agriculture. Moyens de communications. Géographie commerciale.

Commerce. Industrie. Exploitations diverses. Musées de commerce. Statistique géographique.

IV.

Explorations et Voyages.

Voyages. Expéditions. Explorations. Colonisations. Missions religieuses.

V.

Enseignement et Diffusion de la Géographie.

Méthodes d'enseignement. Modèles et instruments destinés à l'enseignement. Cartes murales, atlas, mappemondes terrestres et célestes, globes, reliefs scolaires etc. Enseignement primaire. Enseignement secondaire. Enseignement supérieur. Diffusion de la geographie (Sociétés de géographie, librairie etc). Bibliographie géographique.

Le droit d'entrée au Congrès est fixé à fr. 20. Les membres auront voix délibérative et recevront toutes les publications du Congrés.

Ceux d'entre eux qui ont l'intention de s'inscrire pour une communication sont priés de bien vouloir en indiquer le sujet, ainsi que leur nom, leur qualité et leur domicile en regard des divisons énumérées cidessus et d'adresser le plus tôt possible et avant le premier mars 1891 la présente circulaire ainsi annotée à Mr. Gobat, Conseiller d'Etat à Berne, président du bureau du Congrès.

Le bureau se réserve de porter lui-même des sujets de discussion à l'ordre du jour et de désigner les rapporteurs ainsi que les groupes pour chaque division.

Vous recevrez dans le courant du mois de mars prochain le programme détaillé du Congrès avec l'indication de toutes les communications qui seront annoncées.

Nous vous serions infiniment reconnaissants si vous vouliez bien donner quelque publicité à notre entreprise. Nous vous adressons plusieurs exemplaires de la présente circulaire en vous priant d'en remettre aux géographes, explorateurs et amis des sciences géographiques de votre connaissance.

Dans l'espoir que votre précieux concours ne nous fera pas défaut, nous vous présentons, Monsieur, l'expression de nos sentiments les plus distingués.

Le président du Comité d'organisation: Dr. GOBAT.

Le secrétaire:

C. H. MANN.

N. C.

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